KONECRANES

Operating Instructions

Forklift SMV 10–65, Gen C

OIFLTC_RevE

Original Instructions
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Internal reference: X101986 en-US / E

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TABLE OF CONTENTS

1 INTRODUCTION....7
1.1 About this document....7
1.1.1 Use of the document....7
1.1.2 Terminology....7
1.1.3 Abbreviations....8
1.1.4 Copyright notice....9
1.1.5 Available technical documents....9
1.1.6 Feedback on documents....9
1.2 About this product....9
1.2.1 Use of the product....9
1.2.2 Conditions of warranty....10
1.2.3 Identification of the product....11
1.2.4 Standards and directives....12
1.2.5 Declaration of conformity....13

2 SAFETY AND ENVIRONMENT....15
2.1 Safety messages and symbols....15
2.1.1 Signal words....15
2.1.2 Hazard symbols....15
2.1.3 Mandatory action symbols....18
2.1.4 Prohibited action symbols....19
2.1.5 Safety and information labels on the product....19
2.1.6 Location of the safety and information labels....20
2.2 Responsibilities of the operational manager....26
2.2.1 Preventing work-related hazards....26
2.2.2 Personal protective equipment....26
2.2.3 Incident reporting....27
2.3 Limitations of the product....27
2.3.1 Operating conditions....27
2.3.2 Inclination angles....27
2.3.3 Lift truck danger zones, general....29
2.3.4 Tire explosion danger zone....29
2.3.5 Prohibited use....31
2.3.6 Changes to the product....31
2.4 Emissions....32
2.4.1 Noise....33
2.4.2 Vibration....33
2.5 Protective measures....34
2.5.1 Emergency stopping....34
2.5.2 Battery main switch....35
2.5.3 Releasing the hydraulic pressure....37
2.5.4 Fire safety....37
2.5.5 Emergency exits....38
2.5.6 Mounting, and dismounting the machine....39
2.5.7 Locking the cabin door in open position....39
2.5.8 Personnel requirements....40
2.6 Environmental information....41
2.6.1 Energy consumption....41
2.6.2 Product lifecycle stages....41
2.6.2.1 Production of materials and components....42
2.6.2.2 Equipment manufacturing and assembly....42
2.6.2.3 Use phase, including maintenance and modernization....43
2.6.2.4 Dismantling and handling waste material....43

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2.6.2.5 Deliveries between each stage....44
2.6.3 Notice on the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH).... 45
2.7 Storage information....45
2.7.1 Storage.... 45
2.7.2 Alternative storage, up to two months.... 46
2.7.3 Alternative storage, longer than two months....47

3 PRODUCT DESCRIPTION....49
3.1 Technical description 49
3.2 Machine outline, forklift....51
3.3 Controls and indicators in cabin with lever control 52
3.4 Controls and indicators in cabin with joystick (option).... 53
3.5 Keypad....54
3.6 MD4 display....55
3.6.1 User interface....56
3.6.1.1 Introduction to MD4 pages.... 56
3.6.2 MD4 display frame 56
3.6.3 MD4 pages....60
3.6.3.1 Start-up page.... 60
3.6.3.2 Home page (weight page)....61
3.6.3.3 Date and time page....62
3.6.3.4 ECO-driving page....63
3.6.3.5 Operator page 64
3.6.3.6 Machine overview page....65
3.6.3.7 Information page.... 73
3.6.4 Preferences....74
3.6.4.1 Setting the display backlight and screen saver....74
3.6.4.2 Setting the date....75
3.6.4.3 Setting the time.... 75
3.7 Lifting loads....76
3.7.1 Lifting capacity plate....76
3.7.2 Maneuvering the mast with levers....78
3.7.3 Maneuvering the mast with joystick (option)....79
3.7.4 Mast and attachment symbols....80

4 OPERATING INSTRUCTIONS.... 84
4.1 Daily maintenance before operation....84
4.2 Daily maintenance checks 86
4.2.1 Turning on and turning off the battery main switch.... 86
4.2.2 Checking the condition and pressure of the tires....88
4.2.3 Checking the engine oil level....90
4.2.4 Checking the DANA transmission oil level 92
4.2.5 Checking the ZF transmission oil level.... 93
4.2.6 Checking the coolant level, Volvo engines.... 94
4.2.7 Checking the coolant level, Cummins....95
4.2.8 Checking the hydraulic oil level.... 96
4.2.9 Checking the brake cooling oil level (option).... 97
4.2.10 Checking the engine air filter, Volvo engines 97
4.2.11 Checking the windshield washer level....98
4.2.12 Checking the fuel level.... 99
4.2.13 Checking the AdBlue level.... 100
4.2.14 Check the soot level....102
4.2.15 Adjusting the operator's seat.... 102
4.2.15.1 Adjusting the BE-GE operator's seat.... 103
4.2.15.2 Adjusting the Isringhausen operator's seat....106

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4.2.15.3 Adjusting the Grammer operator's seat ... 107
4.2.16 Adjusting the steering wheel ... 108
4.3 Hydraulic long life (HLL) filter (option) ... 108
4.3.1 Placement of the hydraulic long life (HLL) filter ... 108
4.3.2 Checking the HLL filter ... 109
4.4 Engine After-treatment System (EATS) - Volvo stage V ... 109
4.4.1 Selective catalyst reduction (SCR) - Volvo stage V ... 111
4.4.2 Diesel Particulate Filter (DPF) - Volvo stage V ... 112
4.4.3 Parked regeneration - Volvo stage V ... 113
4.5 Engine aftertreatment System - Cummins engines ... 115
4.5.1 Selective catalyst reduction (SCR) - Cummins engines ... 116
4.5.2 Diesel Particulate Filter (DPF) - Cummins engines ... 118
4.5.3 Parked regeneration - Cummins engines ... 119
4.5.4 Diesel Oxidation Catalyst (DOC) - Cummins engines ... 121
4.6 Using the cabin heating and ventilation ... 122
4.7 Using the cabin ventilation (option) ... 123
4.8 Driver login (option) ... 123
4.9 Changing the operator ... 124
4.10 Break-in period ... 126
4.11 Steering and braking ... 126
4.11.1 Steering ... 126
4.11.2 Using the electrical mini-wheel steering (option) ... 127
4.11.3 Force neutral when braking ... 130
4.11.4 Activating the declutch ... 131
4.11.5 Activating the declutch, with pressure switch (option) ... 132
4.11.6 Activating the inching function (option) ... 132
4.11.7 Parking ... 133
4.11.8 Activating the parking brake ... 134
4.11.9 Automatically applied parking brake (option) ... 134
4.11.10 Differential lock function (option) ... 135
4.12 Sideways sliding cabin ... 136
4.13 Using the 180° rotating seat (option) ... 139
4.14 Operating ... 141
4.14.1 Daily inspection before operation (option) ... 141
4.14.2 Operating - general information ... 141
4.14.3 Starting the engine ... 142
4.14.4 Starting the engine, with RFID tag (option) ... 144
4.14.5 Stopping the engine ... 145
4.14.6 Stopping the engine, with RFID tag (option) ... 146
4.14.7 Operating the machine ... 148
4.14.8 Driving forwards ... 150
4.14.9 Stopping the machine ... 152
4.14.10 Driving in reverse ... 154
4.15 Mounting the attachment - ELME 815 ... 156
4.15.1 Parts of the attachment ... 156
4.15.2 Mounting the attachment - forks in standard position ... 156
4.15.3 Mounting the attachment - forks in inverted position ... 158
4.15.4 Connecting the hydraulic quick couplings ... 159
4.15.5 Connecting the electric contact ... 160
4.16 Lifting and driving with a load ... 161
4.16.1 Lifting a load ... 161
4.16.2 Transporting a load ... 163
4.16.3 Unloading a load ... 165
4.17 Emergency lowering, general ... 167

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4.17.1 Emergency lowering for SMV 10-16 - L90 main valve..... 167
4.17.2 Emergency lowering for SMV 18-60 - K220/L90 main valve..... 168
4.18 Towing.....169

APPENDIX I: FUEL AND OIL RECOMMENDATIONS..... 171
Quality of the engine oil.....171
Extended oil change interval..... 172
Recommended fluids and lubricants.....172

APPENDIX II: FUSES AND RELAYS..... 177
Fuses.....177
Relays.....182

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1 INTRODUCTION

1.1 About this document

This operating instruction offers guidance to enable safe and efficient operation of the equipment.

Taking the time to read this document helps to prevent damage to the equipment, and, most importantly, keep the personnel safe. The equipment is safe when used correctly. However, there are many potential hazards that are associated with incorrect operation. These hazards can be avoided with knowledge about how to recognize and anticipate them.

This document increases the awareness of the responsibilities regarding the equipment. Following the content of this document will ensure that the equipment is kept in a safe operating condition throughout its lifetime.

This document is not intended as a substitute for proper training but provides recommendations and methods for safe and efficient operation and maintenance. The operational manager must ensure that operators are properly trained before operation. They must always comply with all the applicable and prevailing safety, as well as other standards, rules, and regulations.

1.1.1 Use of the document

Every person that is exposed to the equipment must, before operating, servicing and maintaining such products, read, and understand the contents of this document. Also to strictly adhere and conform their conduct with and to the information, recommendations, and warnings that are provided in this document.

NOTE ***Keep the operating instructions in the cabin of the machine for future reference.***

⚠ WARNING

IGNORING INSTRUCTIONS HAZARD

Failure to follow the given instructions could cause death or serious injury.

Read and understand the contents of this document before operating, servicing, and maintaining the equipment.

The manufacturer makes absolutely no warranty whatsoever regarding the contents of this document, express or implied, whether arising by operation of law or otherwise. This includes, but are not limited to, any implied warranties of merchantability or fitness for a particular purpose.

1.1.2 Terminology

All brand names, product names, and trademarks that are used in this document are registered trademarks of their respective owners.

The following terms and definitions may have been used in this document:

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Authorized dealer	Company, or person authorized by **Konecranes Lifttrucks AB** to carry out service actions, and represent the manufacturer.
Authorized personnel	Persons who have the necessary training and who are authorized by **Konecranes Lifttrucks AB** or their representative to carry out operation, or service actions.
Manufacturer	Refers to **Konecranes Lifttrucks AB**, or supplier of part when otherwise specificed.
Operational manager	Person, or persons, with different areas of responsibility at the working site where the machine is used. The areas of responsibility include, but are not limited to risk assessments, daily operations and maintenance tasks.
Battery compartment	A compartment containing the 24V batteries and fuses, which are found on the right side of the machine.
CE marking	The CE marking of the machine is displayed on the lifting capacity plate. The symbol indicates that the machine complies with the appropriate CE regulations.
Check	A visual and functional assessment (not a test) of the machine without dismantling it.
Touch screen display	A touch screen where the user receives information, and enter commands by touching designated areas on the screen.
TRUCONNECT®	**TRUCONNECT®** is a suite of remote service products and applications to support maintenance operations and drive improvements in safety and productivity. The collected data from the machines can be viewed at **yourKONECRANES** customer portal.

1.1.3 Abbreviations

The following abbreviations and shortenings can occur in this document:

Abbreviation	Description	Abbreviation	Description
AEB	Automated determination of the filling paramaters (**A**utomatisiertes **E**rmitteln der **B**efüllparameter)	**LV**	Low Voltage
COG	Center Of Gravity	**NCD**	Nox Control Diagnostics
DEF	Diesel Exhaust Fluid	**PCB**	Printed Circuit Board
DOC	Diesel Oxidation Catalyst	**PCD**	Particle Control Diagnostics
DPF	Diesel Particulate Filter	**PPE**	Personal Protective Equipment
EATS	Engine After-treatment System	**PPS**	Power Pile Slope
ECM	Engine Control Module	**RFID**	Radio Frequency Identification
EMC	Electric Magnetic Compatibility	**SCR**	Selective Catalyst Reduction
FGO	Function Group Output	**SWL**	Safe Working Load

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Abbreviation	Description	Abbreviation	Description
HLL	Hydraulic Long-Life	**TPMS**	Tire Pressure Monitoring System
HVAC	Heating, ventilation, and air conditioning	**ULSD**	Ultra-Low Sulphur Diesel
ISO	International Organization for Standardization	**VCU**	Vehicle Control Unit
LC	Load Center		

1.1.4 Copyright notice

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1.1.5 Available technical documents

For this equipment, there are technical documents that serve different purposes and audiences. Contact your supplier if you require any of the documents that are listed here.

Operating instructions	Describes the responsibilities of the operator and the operating instructions, along with some mandatory daily maintenance tasks and safety information. The operating instruction must be stored in the cabin of the truck.
Maintenance instructions	Describes maintenance tasks such as lubrication and oil change and the recommended safety instructions.
Technical instructions	Describes in greater detail the hydraulic and electrical systems, vehicle control unit, and other components of the machine and its software.
Spare part catalogue	Includes part numbers of all components for the supplied parts, drawings, and exploded views.
Supplier documentation	Describes components that are assembled on the machine, and provided by approved suppliers to the manufacturer. This includes component-specific documents, for example, for installation, operation, and maintenance.

NOTE ***Store documents in a safe, dry place where they can be easily located when required.***

1.1.6 Feedback on documents

As the goal is constant improvement, this document may be updated or revised to provide operational managers and operators with the most accurate information currently available. Current versions of instructions can be found at document portal www.kclifttrucks.com.

To communicate any inaccuracies or omissions, or to provide general feedback or suggestions regarding the quality of this document, send an email to lifttruck.documentation@konecranes.com.

1.2 About this product

1.2.1 Use of the product

The machine is designed to perform lifting and transporting of loads within the limits that are specified in the machine's lifting capacity plate. For more information, see Lifting capacity plate (page 76) in front of the left side cabin door.

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Contact the manufacturer or manufacturer's representative in case of doubt.

1.2.2 Conditions of warranty

The terms under which seller's equipment and/or services are warranted are defined pursuant to the warranty set forth in the contract between seller and customer for seller's products and/or services and, if not so set forth, the warranty for seller's products and/or services is seller's standard warranty in effect at the time of sale, a copy of which is available from seller upon request. THE FOREGOING REPRESENTS THE SOLE AND EXCLUSIVE WARRANTY GIVEN BY SELLER AND IS IN LIEU OF AND EXCLUDES ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, ARISING BY OPERATION OF LAW OR OTHERWISE, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Seller provides no warranties for products manufactured or services provided by parties other than seller ("Third Party Products"). Third Party Products may be warranted separately by their respective manufacturers or such other parties from whom seller purchases such Third Party Products and seller shall, to the extent possible, assign to you whatever rights seller may obtain under any such warranties. Modifying any seller product or incorporating any Third Party Product into any seller product or service without the seller's approval invalidates the warranty. Seller does not accept, shall not have any responsibility and disclaims any liability for accidents, injury or physical or property damage arising as a consequence of such unauthorized modifications and/or incorporation of Third Party Products.

Further, each of the following invalidates any warranty of seller and relieves seller from any responsibility to repair or replace any seller product due to a failure to operate and/or maintain seller products in accordance with the applicable manuals, instructions, guides, recommendations, and any other manuals, guidelines or recommendations of seller concerning the maintenance and operation of seller products that may be communicated to you from time to time; damage or defects caused by side-pulling of load, shock loading, excessive jogging, eccentric loading or overloading, accidental occurrence, improper repair, improper handling or storage of products, chemical exposure, abnormal operating conditions, or any other cause that in seller's sole discretion is not attributable to defects in the material and workmanship of seller’s product. The applicable seller manuals, instructions, guidelines, and recommendations must be strictly complied with by customer which may include, by way of example and not by limitation, installation and commissioning instructions, owner's manuals, operator's/user’s manuals, operating and maintenance instructions and user's guides.

SELLER SHALL HAVE NO LIABILITY TO YOU OR ANY END USER OF PRODUCTS FOR LOST PROFITS OR FOR INDIRECT, SPECIAL, CONSEQUENTIAL, EXEMPLARY OR INCIDENTAL DAMAGES OF ANY KIND WHETHER ARISING IN, CONTRACT, TORT, PRODUCT LIABILITY, STRICT LIABILITY OR OTHERWISE, EVEN IF SELLER WAS ADVISED OF THE POSSIBILITY OF SUCH LOST PROFITS OR DAMAGES. SELLER’S LIABILITY IS LIMITED TO THE AMOUNT OF YOUR DIRECT DAMAGES UP TO THE AMOUNT OF THE CONTRACT PRICE AND IN NO EVENT SHALL SELLER BE LIABLE TO YOU FOR ANY DAMAGES WHATSOEVER IN EXCESS OF THE TOTAL PRICE PAID BY YOU FOR THE APPLICABLE SELLER PRODUCTS. YOU HEREBY WAIVE ANY CLAIM THAT THE EXCLUSIONS OR LIMITATIONS IDENTIFIED HEREIN DEPRIVE YOU OF AN ADEQUATE REMEDY OR CAUSES YOUR AGREEMENT WITH SELLER TO FAIL OF ITS ESSENTIAL PURPOSE. YOU SHALL BE ENTITLED TO NO OTHER REMEDY OTHER THAN THOSE IDENTIFIED IN THE CONTRACT BETWEEN YOU AND SELLER OR SELLER’S STANDARD WARRANTY, WHICHEVER IS APPLICABLE, WITH RESPECT TO THE PROVISION OF PRODUCTS BY SELLER REGARDLESS OF THE FORM OF CLAIM OR CAUSE OF ACTION, WHETHER BASED IN AGREEMENT, NEGLIGENCE, STRICT LIABILITY OR OTHERWISE.

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1.2.3 Identification of the product

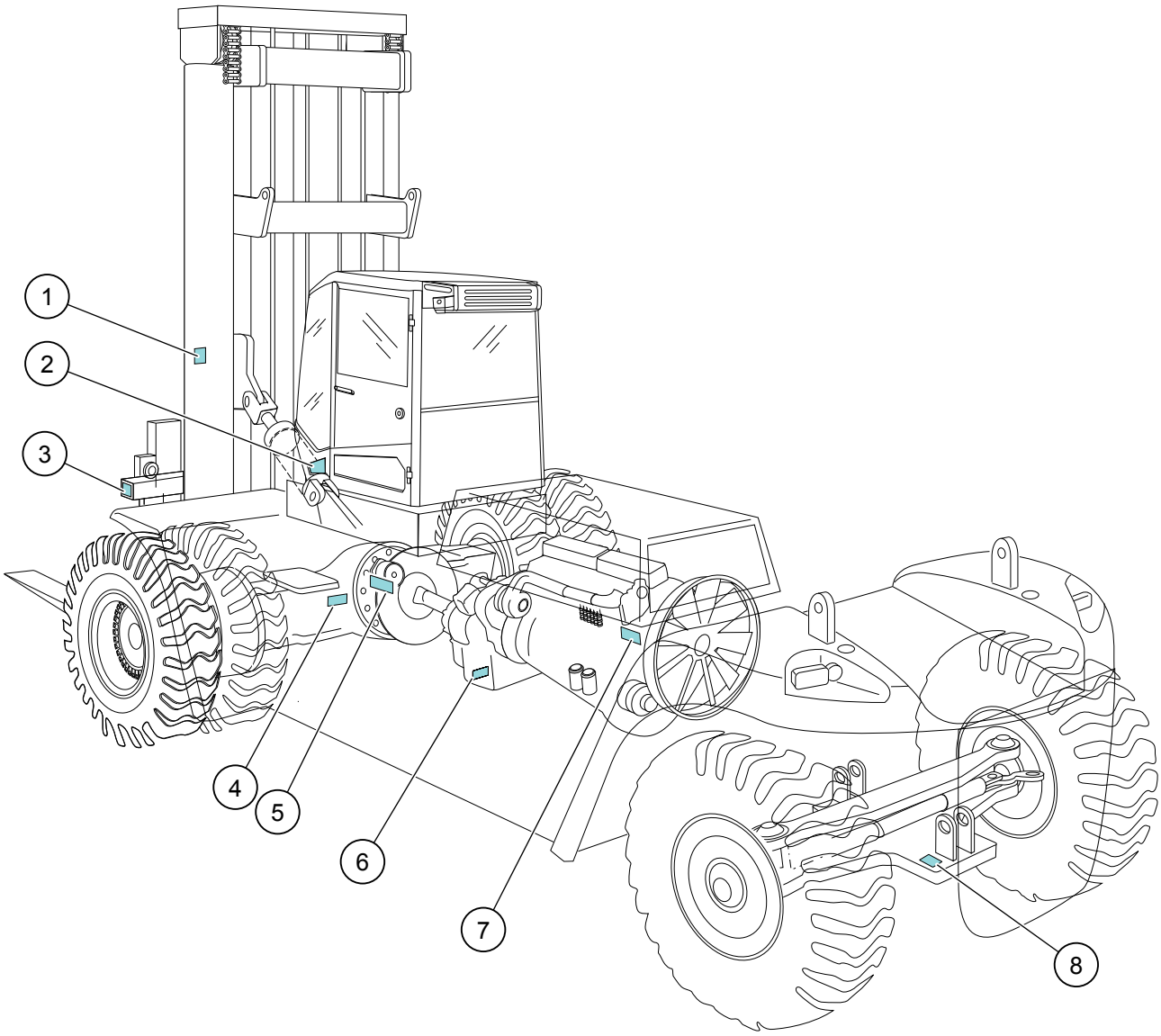

Figure 1. Plates and serial numbers

1. Mast serial number
2. Lifting capacity plate
3. Fork carriage number
4. Drive axle serial number
5. Chassis serial number (punched into the frame)
6. Transmission serial number
7. Engine serial number
8. Steer axle serial number

NOTE ***The appearance may deviate from the delivered product depending on model size.***

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1.2.4 Standards and directives

This product has been designed and manufactured to conform to the following standards and directives:

- **Health and safety:**
  EU: Machinery directive 2006/42/EC

  UK: Supply of Machinery (Safety) Regulations 2008 S.I. 2008:1597

  - EN ISO 3691-1:2015/A1:2020. "Industrial trucks – Safety requirements and verification - Part 1: Self-propelled industrial trucks, other than driverless trucks, variable-reach trucks, and burden-carrier trucks".
  - ISO/TS 3691-8:2012,IDT. Industrial trucks – Safety requirements and verification. Regional requirements for countries outside the EC.
  - EN 16307-1:2013+A1:2015. "Safety requirements and verification. Supplementary requirements for self-propelled industrial trucks, other than driverless trucks, variable-reach trucks, and burden-carrier trucks" (EU/EFTA market).
  - EN 13059+A1:2008. "Safety of industrial trucks. Test methods for measuring vibration" (EU/EFTA market).
  - EN 12053+A1: 2008. "Safety of industrial trucks. Test methods for noise emission" (EU/EFTA market).
  - EN 1175-2+A1:2010 “Safety of industrial trucks – Electrical Requirements - Part 2: General requirements of internal combustion engine powered trucks“.
- **EMC**:
  EU: 2014/30/EU

  UK: Electromagnetic Compatibility Regulations 2016 S.I. 2016:1091

  - EN 12895:2015+A1:2019. Industrial trucks - Electromagnetic compatibility.
- **Emissions**:
  EU: 2016/1628/EC (EU/EFTA market, stage 4, and 5 engines).

  UK: The Non-Road Mobile Machinery (Type-Approval and Emission of Gaseous and Particulate Pollutants) Regulations 2018 2018 No. 764
- 2016/1628/EU “REGULATION (EU) 2016/1628 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 14 September 2016 on requirements relating to gaseous and particulate pollutant emission limits and type-approval for internal combustion engines for non-road mobile machinery, amending Regulations (EU) No 1024/2012 and (EU) No 167/2013, and amending and repealing Directive 97/68/EC"

Declaration of conformity and other certificates are included in the delivery package.

NOTE ***Manufacturer reserves the right to modify the design and material specifications without prior notice.***

Applicable sections of **EN13155** are used for all lifting ears on the machine.

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1.2.5 Declaration of conformity

KONECRANES®
Lifting Businesses™

EC DECLARATION OF CONFORMITY OF THE MACHINERY

(Machinery Directive 2006/42/EC, Annex II, sub. A)

Manufacturer:
Konecranes Lifttrucks AB
Anders Anderssons väg 13, P.O. Box 103
SE-28523 MARKARYD
SE

Name and address of the person authorised to compile the technical file:
XXXXX XXXXX
Anders Anderssons väg 13, P.O. Box 103
SE-28523 MARKARYD
SE

The manufacturer declares that
Description: **Forklift**
Model: **XXXXX**
Serial number: **XXXXX**

• Is in conformity with the relevant provisions of the DIRECTIVES OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL:

- of May 17, 2006, "relating to machinery" 2006/42/EC

- of February 26, 2014, "relating to electromagnetic compatibility" 2014/30/EU

- Directive 2000/14/EC as amended by Directive 2005/88/EC on the noise emission in the environment by equipment for use outdoors

and fulfils the requirements of the following harmonised standards:

• regarding Machinery Directive: EN ISO 3691-1

• regarding EMC Directive: EN 12895

Place and date of issue: MARKARYD DD.MM.YYYY

Signature:

Anders Nilsson
Technical Director
Konecranes Lift trucks

Figure 2. EC Declaration of conformity of the machinery (template)

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KONECRANES®
Lifting Businesses™

UK DECLARATION OF CONFORMITY OF THE MACHINERY

(Supply of Machinery (Safety) Regulations 2008, Annex II, sub. A)

Manufacturer:
Konecranes Lifttrucks AB
Anders Anderssons väg 13, P.O. Box 103
SE-28523 MARKARYD
SE

Name and address of the person authorised to compile the technical file:
XXXXX XXXXX
Coalfield Way
LE65 1NF Ashby De La Zouch
UK

The manufacturer declares that
Description: **Forklift**
Model: **XXXXX**
Serial number: **XXXXX**

• is in conformity with the relevant provisions of statutory instruments

- Supply of Machinery (Safety) Regulations 2008 No.1597

- Electromagnetic Compatibility Regulations 2016 No.1091

- Noise emission in the environment by Equipment for use Outdoors Regulations 2001 No.1071

and fulfils the requirements of the following designated standards:

• regarding 2008 No. 1597: EN ISO 3691-1

• regarding 2016 No. 1091: EN 12895

Place and date of issue MARKARYD DD.MM.YYYY

Signature:

Anders Nilsson
Technical Director
Konecranes Lift trucks

Figure 3. UK Declaration of conformity of the machinery (template)

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2 SAFETY AND ENVIRONMENT

2.1 Safety messages and symbols

2.1.1 Signal words

The following signal words and symbols are used to identify safety messages in these instructions.

DANGER

Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury.

WARNING

Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

NOTICE

Indicates a potentially hazardous situation that, if not avoided, could result in damage to property or environment.

2.1.2 Hazard symbols

Hazard symbols are used to indicate the type of the hazard and the potential consequences. Hazard symbols are indicated by a yellow triangle with black symbols and a black triangle band. All personnel working on or in proximity of the machine must understand and follow the information that is given in all hazard symbols.

General hazard symbol

General hazard

The general hazard symbol identifies important safety messages in this document. When you see this symbol, carefully read and understand the message that follows, and inform other users when necessary.

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Mechanical hazard symbols

Moving vehicle hazard

Sideways tipping hazard

Forward or backward tipping hazard

Run over hazard

Moving parts hazard

Falling load hazard

Slipping hazard

Hanging load hazard

Crushing hazard

Crushing hand hazard

Flying objects to face hazard

Flying objects hazard

Skin injection hazard

Electrical hazard symbols

Electrical hazard

Material hazard symbols

Hot liquid hazard

Explosion hazard

Harmful substance hazard

High-pressure hazard

Ignition hazard

Corrosive chemical substance hazard

Pressurized gas hazard

Hazardous or poisonous material hazard

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Thermal hazard symbols

Hot surface hazard

Slippery when frozen hazard

Noise hazard symbols

Noise hazard

Laser hazard symbols

Laser hazard

Ergonomic hazard symbols

Lifting hazard

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2.1.3 Mandatory action symbols

Mandatory action symbols specify actions to be taken to avoid a hazard. Mandatory actions are indicated by blue circle with white symbols. All personnel working on or in proximity of the machine must understand and follow the information that is given in all mandatory action symbols.

Wear approved safety gloves

Wear approved hearing protectors

Wear approved protective clothing

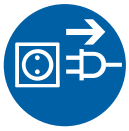
Wear approved safety shoes

Wear approved safety harness

Wear approved hard hat

Wear approved high visibility clothing

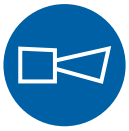
Wear approved eye protector



Disconnect equipment from power source

Apply indicator for pin-hole leak test

Use jack



Alarm horn

Read instructions

Two persons for handling

Wear approved respirator

Use seat belt

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2.1.4 Prohibited action symbols

Prohibited action symbols indicate actions that are prohibited in order to avoid a hazard. Prohibited actions are indicated by a red circle with a red diagonal line across the circle. The action that is prohibited is always in black. All personnel working on or in proximity of the machine must understand and follow the information that is given in all prohibited action symbols.

General prohibition

Do not walk or stand here

Do not weld

No open fire

Do not smoke

Do not modify

Do not test for leak with hands

Do not touch

Restrict access

2.1.5 Safety and information labels on the product

The safety and information labels communicate the following:

- Level of risk that is based on the signal word **Danger**, **Warning**, or **Notice**
- Type of hazard, such as cutting parts, hanging load, hot surface, live parts
- Consequence of hazard, such as cutting, injection, crushing, burn, electric shock
- How to avoid the hazard

NOTE

Always keep safety and information labels visible, and check the condition of the labels daily. Before operating the machine, replace labels that are damaged, have come loose, or do not meet the readability requirements for safe viewing distance. New safety and information labels can be ordered from the manufacturer of the machine.

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2.1.6 Location of the safety and information labels

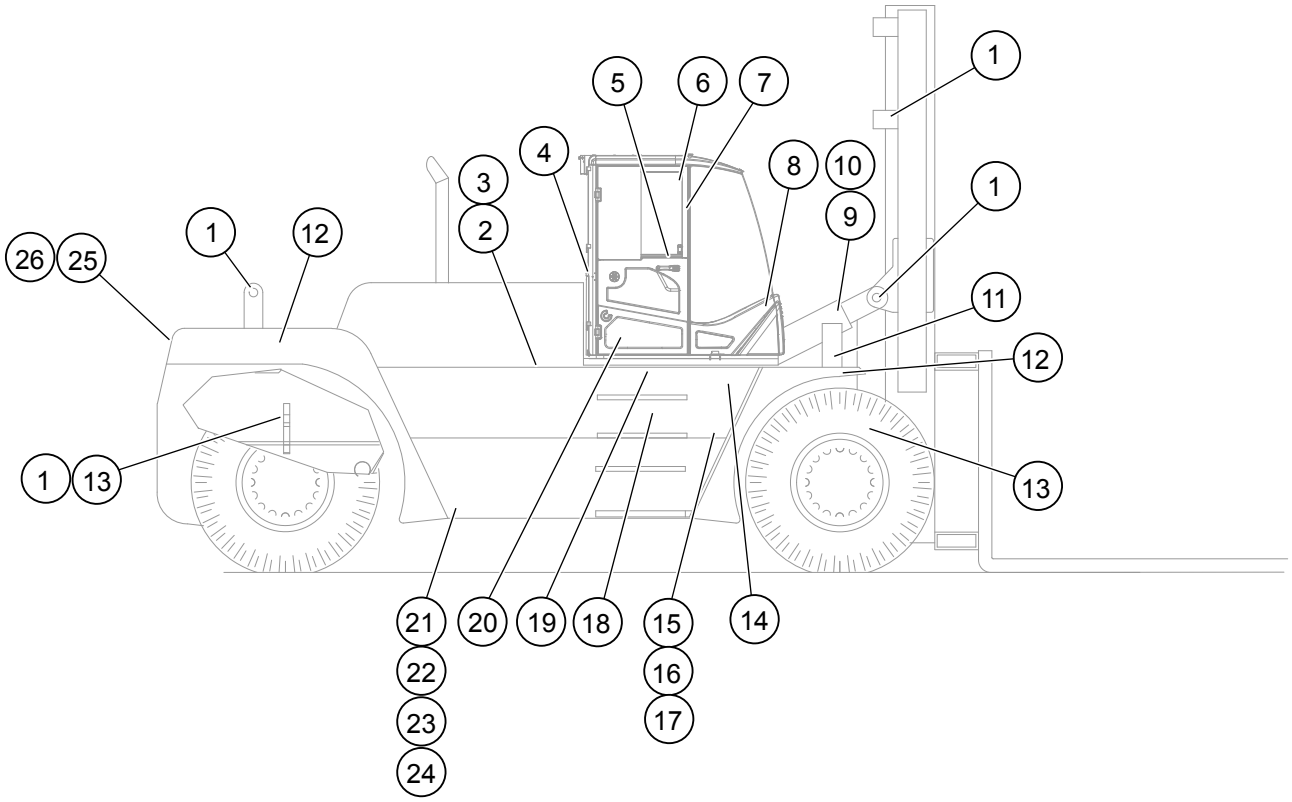

Figure 4. Location of the safety and information labels

1. Lifting point
2. Engine oil
3. Transmission oil
4. Fuses and relays, PCB
5. Emergency exit only
6. Seat belt
7. In case of rollover
8. Working zone
9. Crush injury risk
10. Injection hazard
11. Do not stand under or on lifted load
12. Tire pressure 10 bar (1.0 MPa)*)
13. Tie down point when transporting the machine
14. Accumulator pressure
15. Hydraulic oil
16. Diesel fuel
17. Brake cooling oil
18. Do not step here
19. Remove pressure before demounting tire
20. Read operating instructions first
21. Battery main switch
22. Cab tilting
23. Fuses and relays, battery compartment
24. Warning-Acid and explosion risk
25. Crushing risk by tire
26. Machine working zone

*) Sign present above all tires.

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Table 1. Labels

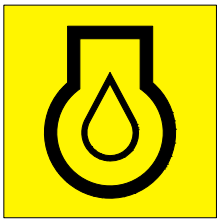
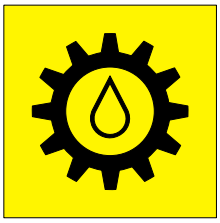
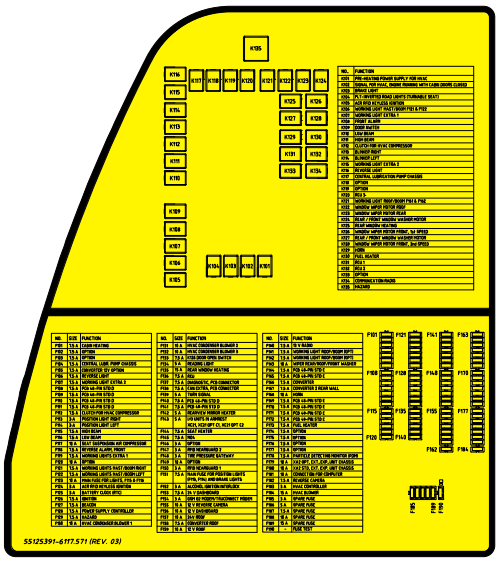
	1. Lifting point
	**2. Engine oil**
	**3. Transmission oil**
	**4. Fuses and relays, PCB**
	5. Emergency exit only

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Table 1. Labels (Continued)

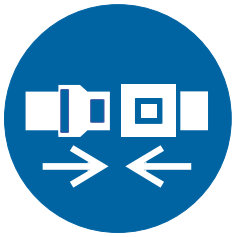
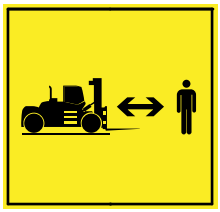
	**6. Seat belt**
	7. In case of rollover This sticker shows what the operator must do in case of rollover. Do not jump out of the cabin in case of rollover. Brace feet against the floor and hold on tightly to the steering wheel. Climb out of the machine when it has stopped moving.
	**8. Working zone**
	9. Crush injury risk

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Table 1. Labels (Continued)

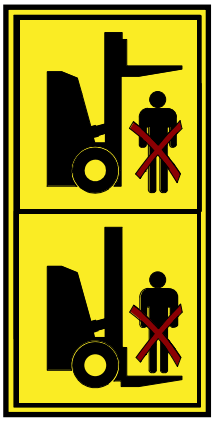
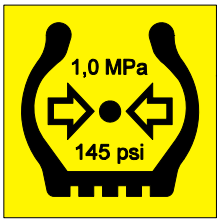
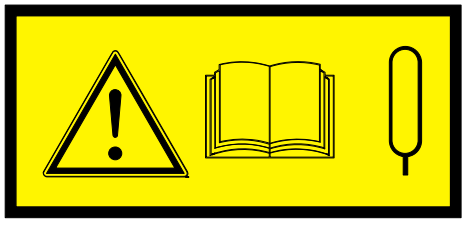
	10. Injection hazard
	**11. Do not stand under or on lifted load.**
	**12. Tire pressure 10 bar (1.0 MPa)**
	13. Tie down point for loading the machine for transport Secure the machine here when loading it for transport.
	**14. Accumulator pressure** Warning, read instructions in the manual.

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Table 1. Labels (Continued)

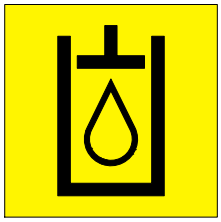
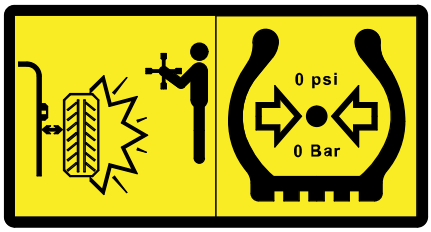
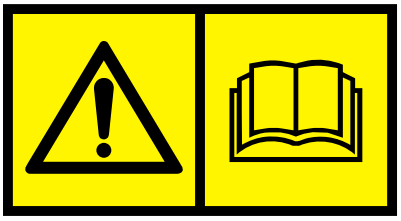
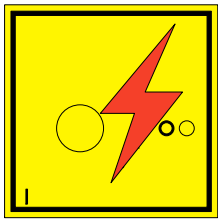
	**15. Hydraulic oil**
	16. Diesel fuel
	17. Brake cooling oil
	18. Do not step here
	**19. Remove pressure before demounting tire**
	**20. Warning - Read operating instructions first**
	**21. Battery main switch**

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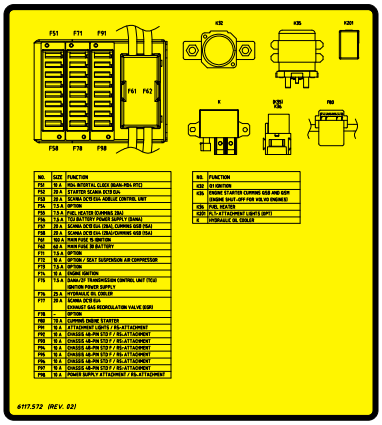
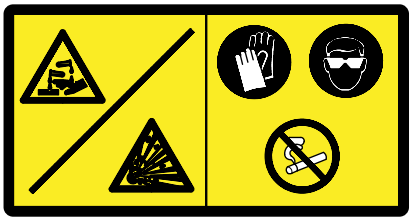
Table 1. Labels (Continued)

	22. Cab tilting
	**23. Fuses and relays, battery compartment**
	**24. Warning - Acid and explosion risk**
	25. Crushing risk by tire
	26. Machine working zone

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2.2 Responsibilities of the operational manager

2.2.1 Preventing work-related hazards

The operational manager must ensure that operators, and maintenance personnel have sufficient knowledge of the work-related hazards, and the ways to avoid the hazards.

The operational manager must ensure to inform the operator that a local risk assessment always must be performed before every work phase or shift. The assessment ensures that the operator stops and thinks about what to do before starting to work.

- Identify potential hazards that could affect the operator, other personnel, the environment, the product, or work methods while performing the task
- Assess the risks and implement the actions that are required to eliminate or reduce the risks

Only personnel with sufficient competence are allowed to operate the machine, and carry out other tasks on the machine.

The responsibilities of the operational manager are, for example, to:

- Provide training and orientation.
- Validate training methods.
- Verify competence and skills.
- Monitor and evaluate user performance regularly.
- Provide fire-fighting equipment.
- Make sure that the working site has guidelines on how to prevent fires.
- Make sure that the working site has guidelines to follow concerning fire-fighting.
- Make sure that the working site has guidelines on how to operate the machine during strong wind.
- Make sure that the instructions from Konecranes Lift Trucks are accessible and up to date.
- Make a risk assessment of the work site, for example, regarding height limitations, door openings, overhead powerlines, and ground conditions.
- Make sure that the work site follows all local rules and regulations.

2.2.2 Personal protective equipment

NOTE ***For safety, all personnel working in or near the machine are required to wear personal protective equipment (PPE).***

NOTE ***This section proposes personal protective equipment to ensure the safety of all personnel working in or near the machine. Follow the local regulations and requirements of the working environment. Use only approved and accepted personal protective equipment.***

Operators and anyone near and around the product **must** wear the following items:

- Safety shoes
- High-visibility clothing

Various types of PPE are available as listed, depending on the situation, other types of PPE than listed can be required. It is the responsibility of the operational manager to make sure that all local PPE requirements are followed.

- Hard hat
- Eye protection
- Ear protection
- Respirator
- Safety gloves
- Protective clothing
- Safety harness when working at heights

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Do not wear loose clothing or jewelry that can get caught on controls or pulled into moving parts of the product.

Do not wear jewelry or metal accessories such as watches when working with or near the electrical system or the batteries.

Tie back long hair. Long hair can get entangled.

Select the appropriate clothing for each task, for example:

- Wear fire-resistant clothing when welding, flame cutting, or using an angle grinder.
- Tear-resistant clothing must resist damage from sharp edges in the steel structure.
- Wear anti-static clothing when working on electrical circuits so that components do not get damaged by a discharge of static electricity.
- Always use safety goggles when working with high voltage or pressurized fluids.
- When working with lubricants, clothing must prevent direct skin contact with the lubricant.
- Choose clothing with consideration to the temperature at the working site, and stay hydrated.

2.2.3 Incident reporting

Product safety issues that you must report are events in which the manufacturer's product has been involved in an accident or near-miss incident. Contact your local manufacturer's representative immediately to report any safety-related feedback, such as unauthorized modifications, missing instructions and safety labels, neglected maintenance, or misuse.

Reporting is mandatory to ensure safe working conditions for employees, to provide information for the risk assessment process, and to initiate product and work procedure improvements.

2.3 Limitations of the product

2.3.1 Operating conditions

Thunderstorm

When in danger of being struck by lightning, operating or being close to the machine is strongly discouraged. Protection from lightning during work must be managed by the workplace risk assessment that is made by the operational manager.

Following a lightning strike (or if you suspect the machine has been struck) the machine must be checked by authorized personnel. The check must follow the instructions of the daily maintenance.

Surfaces

Do not operate the machine on uneven surfaces or in unstable conditions.

NOTE ***Do not drive on slopes that are greater than 15%.***

2.3.2 Inclination angles

⚠ WARNING

TIPPING AND COLLISION HAZARD

If you drive on slopes greater than 15%, the parking brake may fail and risk of tipping increases considerably. Risk of serious personal injury and damage to the machine.

Do not drive on slopes greater than 15%.

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⚠ WARNING	
	RISK OF LOAD DROP **Driving downhill on slopes carrying a load, can lead to a load drop. This can damage the machine and can lead to serious personal injury.** **If carrying a load, always drive downhill in reverse.**

NOTE ***If you must drive the machine along greater slopes, contact your Konecranes Lift Trucks authorized dealer.***

NOTE ***Do not drive on slopes that are greater than 15%.***

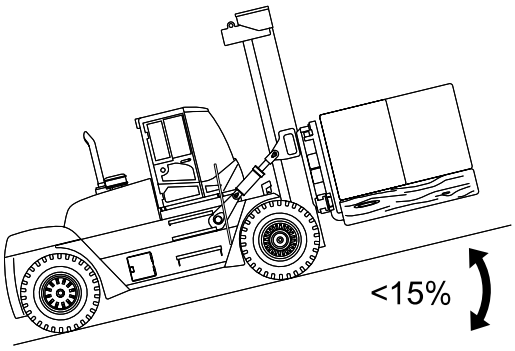

Figure 5. Do not drive on slopes greater than 15%

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2.3.3 Lift truck danger zones, general

DANGER

MOVING MACHINERY HAZARD

The moving machine and its moving parts can cause death or serious injury.

While the machine operates, unauthorized personnel should never enter or be within the danger zone.

During operation, the authorized personnel working within the danger zone and the operator must constantly communicate verbally or visually to stay aware of each other.

The following images show the danger zones surrounding the machine and its parts.

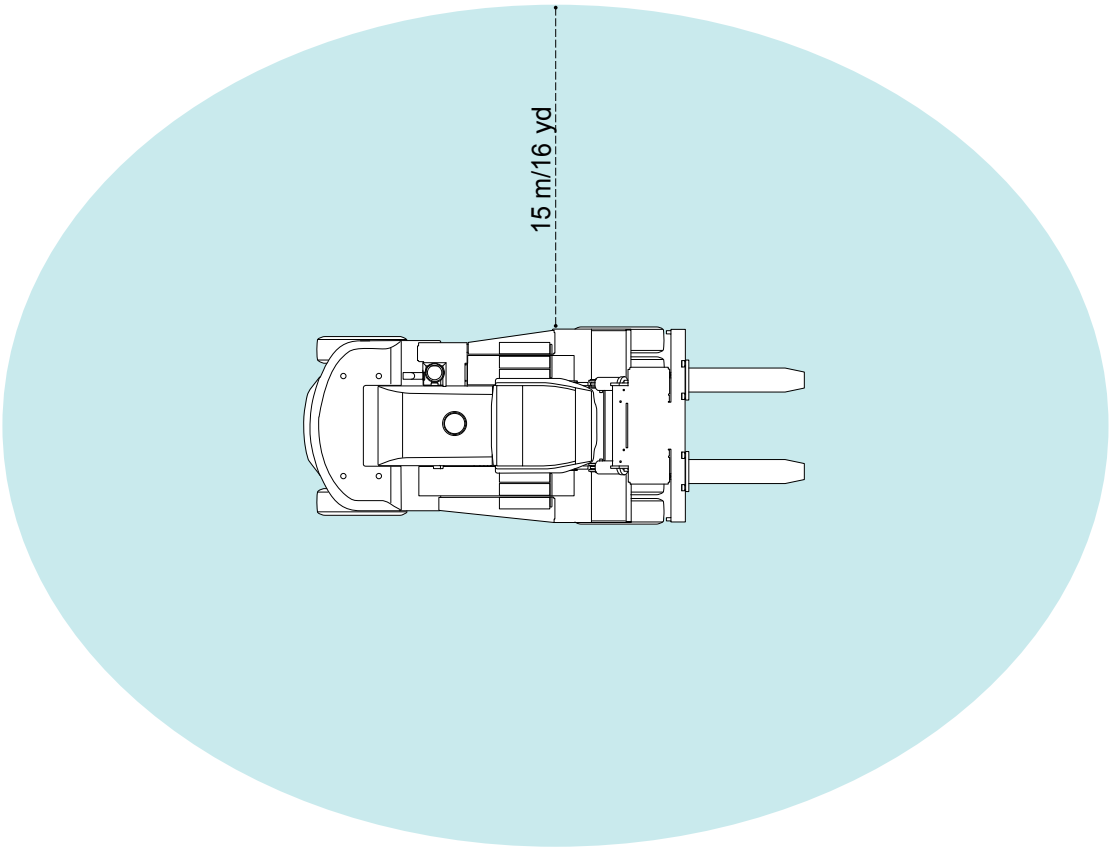

Figure 6. General danger zone

2.3.4 Tire explosion danger zone

DANGER

HIGH-PRESSURE HAZARD

The tires may explode when you inflate or deflate them, or in case of fire. Standing inside the tire explosion danger zone during a tire explosion can cause death or serious injury.

Always stand to the side of the wheel when deflating or inflating tires, see "tire explosion danger zone" illustration. Use safety glasses.

NOTE ***The tire explosion danger zone follows the positioning of the wheels. The illustration applies when the wheels are in line with the machine.***

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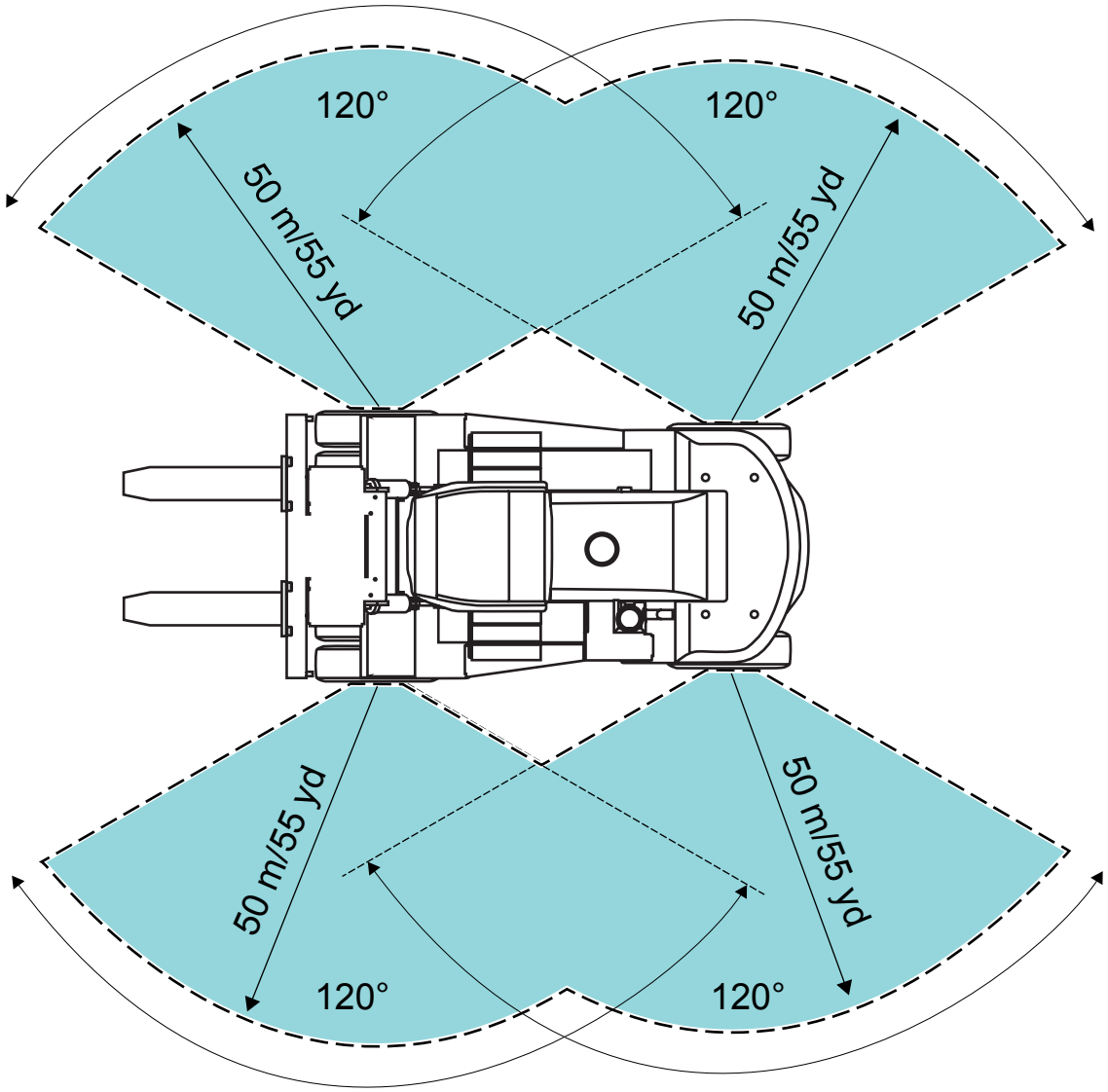

Figure 7. Tire explosion danger zones

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2.3.5 Prohibited use

⚠ WARNING

MACHINE MALFUNCTION HAZARD

Using the machine outside the limits of its capacity or operating conditions could cause malfunction of the equipment. Unauthorized usage could lead to death, severe injury, or property damage.

Do not use the machine outside the limits of its capacity or operating conditions.

The misuse of the equipment includes, but is not limited to:

- Lifting or transporting people.
- Driving with the load above transport position.
- Driving with heavy loads in slings.
- Driving with swinging load.
- Having passengers in the cabin [1)]
- Driving on uneven terrain
- Exceeding the load limit, which is shown on the lifting capacity plate
- Adding extra counterweights
- Driving uphill and downhill on slopes with an inclination over 15%.
- Using tools that are not approved by the manufacturer.
- Using the low-voltage battery switch when the machine is in motion.
- Overriding any safety systems.
- Using the emergency stop in a none emergency situation.

NOTE ***Only use the emergency stop in an emergency situation.***

[1)] If a truck is equipped with an optional trainer's seat, another person is allowed to sit there, as long as the person uses the seat belt.

For more information, see the lifting capacity plate of the machine, and, if applicable, lifting capacity plates on attachments.

Contact the manufacturer or the representative for the manufacturer if there are any doubts.

2.3.6 Changes to the product

⚠ DANGER

MACHINE MALFUNCTION HAZARD

Unauthorized changes, or modifications to the product can lead to death, severe injury, or property damage.

Always contact Konecranes Lift Trucks, or an authorized representative to get a written approval in advance for any product change or modification.

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⚠ DANGER

MACHINE MALFUNCTION HAZARD

Changes, and modifications without proper risk assessment, can lead to death, or serious personal injuries. It can also damage property, or the environment.

Unauthorized modifications void the warranty and responsibility of the manufacturer.

Perform a risk assessment, which eliminates, or reduces risks, and considers appropriate safety measures.

⚠ WARNING

MACHINE MISUSE HAZARD

Adding and using equipment that is not supplied with the machine, can cause the products to malfunction. Risk of serious personal injury and damage to the machine.

If using equipment that was not supplied with the machine, an authorized dealer must approve the combination and use of the equipment. The authorized dealer must ensure that safe operations can be guaranteed concerning lifting capacity, stability, and visibility.

⚠ WARNING

MACHINE NON-COMPLIANCE

Replacing components with non-genuine components, or components not authorized by Konecranes Lift Trucks, can affect the safety of the machine. This is considered as a modification of the machine and therefore voids the liability of Konecranes as a manufacturer.

The party that performed the modification will thereafter legally be liable for the safety of the modified machine, and the related CE marking.

For any clarification always contact your authorised Konecranes Lift Trucks representative.

All modifications and corrections that are not authorized in the product documents or which may affect the maintenance, operation, safety, and availability of the product must be approved in writing by **Konecranes Lift Trucks** before implementation. Approval requires a risk assessment which consider any new risks that the changes and modifications may bring.

All safety and information labels on the machine, must be updated to match the machine after any modifications.

To avoid using obsolete spare parts, always check the specific spare parts catalogue for the machine. For the latest version, contact Konecranes Lift Trucks spare parts department.

If a modification or correction has been implemented without the permission from **Konecranes Lift Trucks**, its effect on warranty liability is considered case-by-case. Thus, the warranty application may be rejected altogether. If a modification, or alteration is considered necessary, contact an authorized dealer, or the organization that manufactured, and designed the product. No modification is permitted, unless the written approval from the manufacturer is obtained.

2.4 Emissions

The noise and vibration levels are checked according to industry standards. This is to make sure that the operator's have a healthy environment while operating the machine.

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2.4.1 Noise

Measured sound levels

⚠ WARNING

NOISE HAZARD

Continuous exposure to noise above 80 dB(A) can cause hearing impairment, and make the operator tired and unfocused.

Wear approved hearing protectors.

The noise values were measured according to the harmonized standard EN12053 – A1:2008, following the conditions described therein, by a notified body. The noise values are reported according to ISO4871:2009.

The specified equipment has been assessed in accordance with Directive 2000/14/EC (amended by Directive 2005/88/EC), annex VI by notified body 0404, RISE SMP Svensk Maskinprovning AB (The Swedish Machinery Testing Institute).

Declared dual-number noise emission values In accordance with ISO4871:2009				
	Lift mode	Idle mode	Drive mode	Total
Time proportion factors of the operating cycle (%) - ref. EN12053+A1:2008	0.18	0.58	0.24	1
A-weighted emission sound pressure level at the operator position LpAZ (dB)	75	74	76	76
Uncertainty (dB)	1	1	1	1
C-weighted peak emission sound pressure level	< 130	< 130	< 130	< 130
Measured sound power level in an operational cycle (A-weighted)	102			
Guaranteed sound power level in an operational cycle (A-weighted)	104			
Measured on 16-33 ton forklifts, for other sizes, the values may vary slightly.				

Where the time proportion factors are used in defining the operational cycle, they are as defined in EN12053+A1:2008.

2.4.2 Vibration

The whole-body vibration has been measured according to the harmonized standard EN13059:2008, following the conditions described therein, by a notified body.

- Measured whole body vibration: below 0.9 m/s²
- Overall uncertainty of the measurement: 1 m/s²

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The reported expanded uncertainty is based on a standard uncertainty that is multiplied by a coverage factor K = 2. For a normal distribution, this value provides a level of confidence of approx. 95%.

The standard uncertainty has been determined in accordance with EA publication EA-4/16/2003.

2.5 Protective measures

2.5.1 Emergency stopping

⚠ DANGER

UNCONTROLLED MOVEMENT HAZARD

If the machine moves unexpectedly, it could result in personal injury, death, or damage to the equipment.

To stop any unexpected movement, press the emergency stop button.

⚠ WARNING

FORWARD TIPPING HAZARD

If the emergency stop is used when the machine moves, the machine may tip over. Risk of serious personal injury and damage to the machine.

Only use the emergency stop in an emergency.

NOTE ***Do not operate the equipment without knowing the location of the emergency stop buttons.***

After the emergency stop button (1) is pressed, all functions are cut out, the parking brake is activated and the engine stops. In normal operation, do not use the emergency stop button to stop the machine. Instead, use the brake pedal.

NOTE ***Only use the emergency stop button in an emergency situation. Routinely using the emergency stop button increases wear on the product and can cause a breakdown.***

After each time the emergency stop is used, a daily maintenance must be performed to check the overall function of the machine.

If the machine moves when pressing the emergency button, the condition of the parking brake disc and pads must also be checked. Contact authorized service personnel for the check-up.

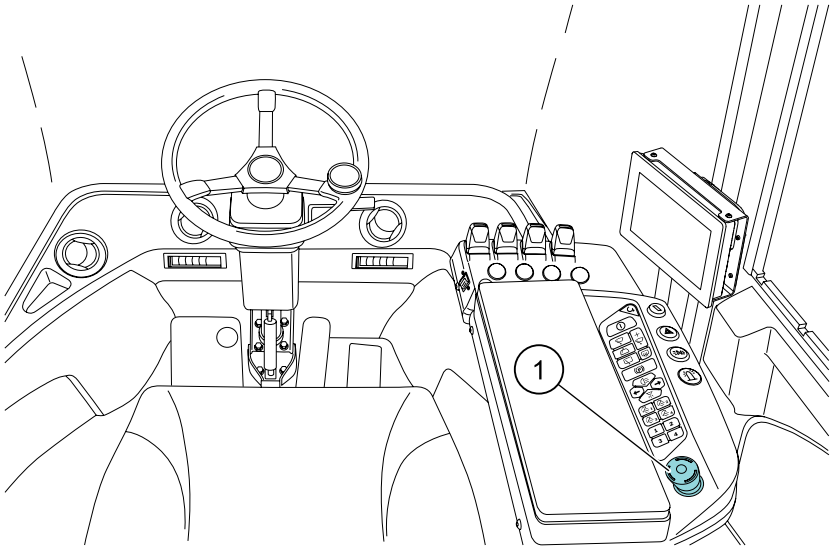

Figure 8. Emergency stop inside the cabin

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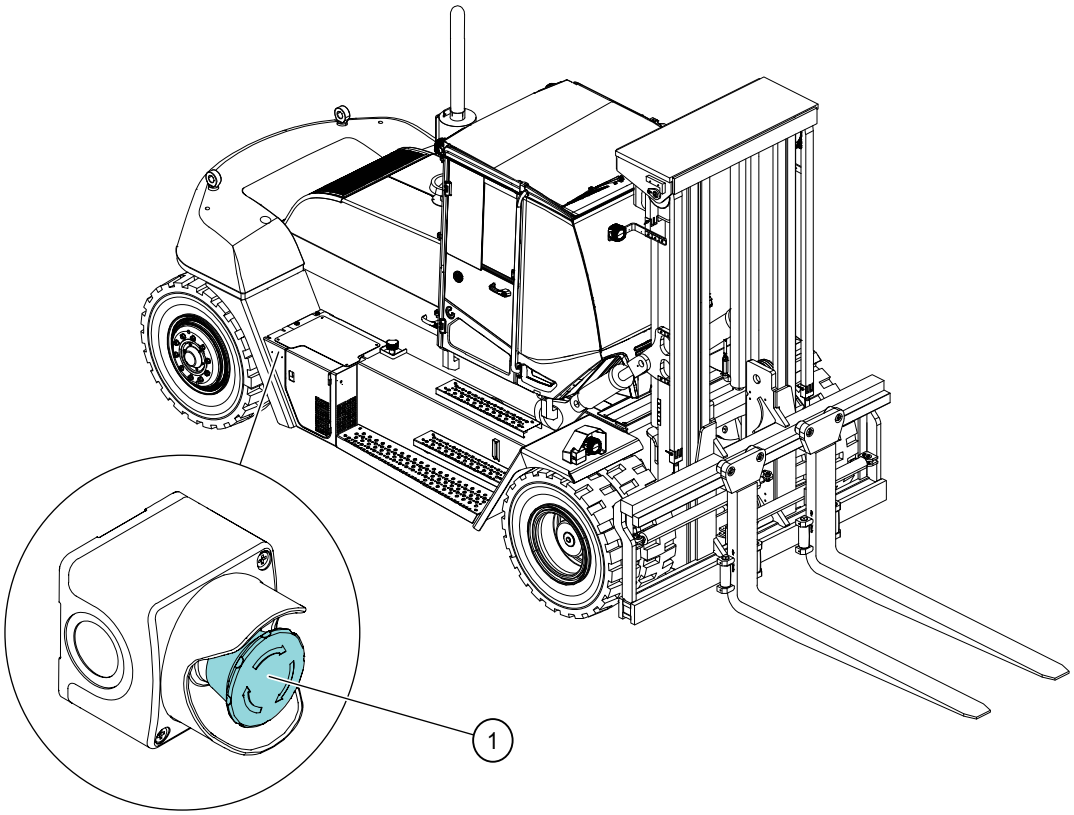
Emergency stop on the outside of the machine



2.5.2 Battery main switch

DANGER	
	EXPLOSION HAZARD **Short-circuiting the battery may cause a fire or explosion, which can cause a risk of serious injury or death.** **To reduce the risks of fire, explosion, electric shock and personal injury, always remove jewelry and conductive material before working on the electrical system.**

DANGER	
	EXPLOSION HAZARD **Batteries generate explosive hydrogen when charged, which can cause a risk of serious injury or death.** **Always use the necessary protective equipment. Ensure that there is good ventilation and avoid sparking.**

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⚠ DANGER

ELECTRIC SHOCK HAZARD

If the engine is on, there may still be voltage present in some parts, even when the battery main switch is turned off. The main switch does not cut the power from the alternator. This causes a risk of electric shocks, which can lead to death or serious personal injury.

To reduce the risks of electric shock and personal injury always remove jewelry and conductive material before working on the electrical system.

Always disconnect the ground (minus) cable at the battery when working near or on the alternator.

Be aware of the battery main switch functionality.

⚠ WARNING

TIPPING OVER HAZARD

If the battery main switch is turned off when the machine moves, the parking brake is activated. The machine may tip over, causing a risk of serious personal injury and damage to the machine.

Unless there is an emergency situation, do not turn off the battery main switch when the engine runs.

NOTE ***Do not operate the machine without knowing the location of the battery main switch (1).***

NOTE ***If the machine has an engine that uses diesel exhaust fluid (DEF) solution (for example AdBlue), turn off the engine, but do not turn off the battery main switch. Wait for the DEF pump to finish pumping back all the fluid from the hoses to the DEF tank before turning off the battery main switch (1). The required time varies slightly between different engine models.***

NOTE ***Remove the main switch handle when parking the machine.***

The battery main switch is found on the right-hand side of the machine, near the battery compartment. The machine can only be operated when the power is turned on.

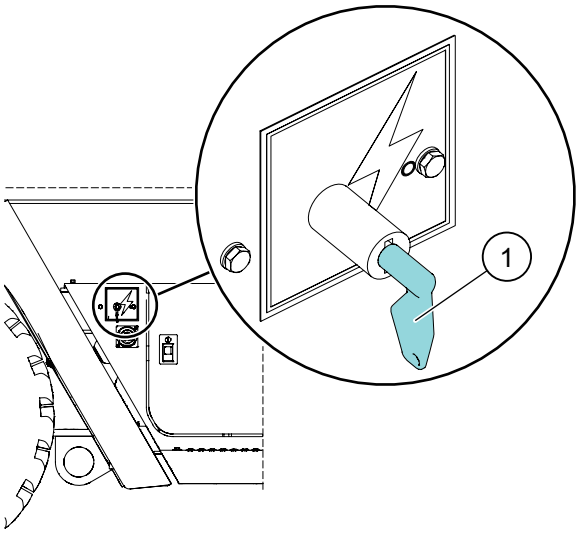

Figure 9. Battery main switch

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2.5.3 Releasing the hydraulic pressure

⚠ WARNING

HIGH-PRESSURE HAZARD

The hydraulic system contains hydraulic accumulators to maintain the brake function during a possible engine failure. Risk of serious personal injury.

Do not stand close to the engine or transmission when the engine runs.

Never loosen any hydraulic hoses.

Only authorized maintenance personnel are permitted to loosen any hydraulic hoses.

NOTE ***For more information about how to release the hydraulic pressure, see the Maintenance instructions.***

2.5.4 Fire safety

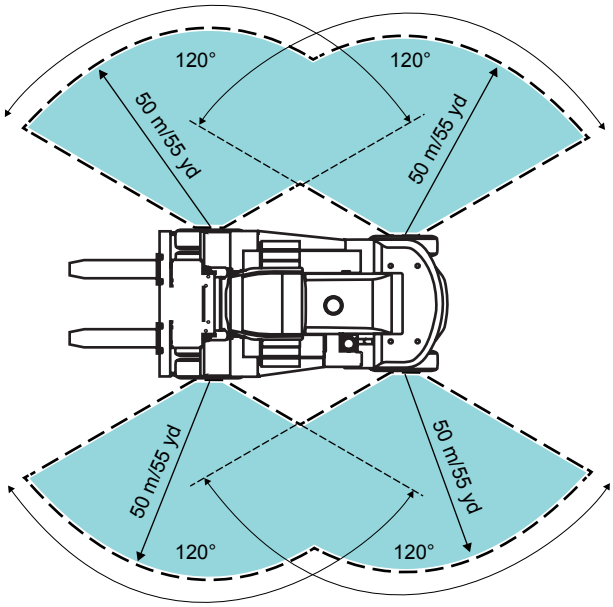
⚠ DANGER

FIRE AND EXPLOSION HAZARD

Ignition sources together with combustible materials can cause fire. If these risks are not avoided, they could lead to death or severe injury. Smoking, open flames, and sparks are examples of ignition sources. Fuel is an example of combustible material.

Ignition sources are prohibited near the machine.

During maintenance, follow appropriate fire prevention and protection measures. Measures include but are not limited to trained personnel and proper fire extinguishing equipment. Before starting any maintenance or repairs that require ignition sources, carry out a proper risk assessment to control the risk.



NOTE ***In case of fire, approach the machine from the front or the back. If possible, always avoid the tire explosion danger zones.***

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- Smoking and open fire are prohibited near the product.
- Access to all fire-fighting equipment must be granted always, especially during maintenance and repair works.

NOTE ***Fire-fighting equipment is not a standard part of the machine. It is the responsibility of the operational manager to make sure that fire-fighting equipment is available.***

- All fire-fighting equipment must be inspected and serviced regularly, according to local regulations.
- Damaged fire-fighting equipment and used fire extinguishers must be replaced immediately.
- Know the various types of fires and the appropriate fire-fighting methods. Various fires must not be extinguished with water. Special extinguishing agents, dry powders, or deoxygenating agents are required.
- It is the responsibility of the operational manager to make sure that the working site has guidelines to follow concerning fire-fighting.
- All personnel must be aware of the guidelines and trained regularly in fire-fighting methods.

NOTE ***It is strongly suggested that guidelines, and training is performed in cooperation with local authorities, and rescue organizations.***

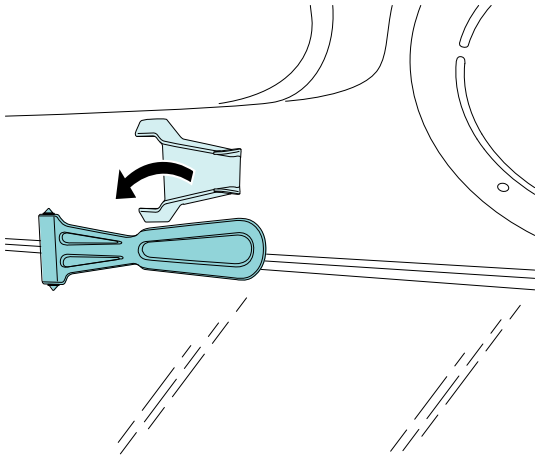
2.5.5 Emergency exits

The cabin door on the left-hand side is the main emergency exit.

If the left-hand side door is blocked, use the right-hand side door. If both the left and right doors are blocked, use the emergency hammer (option) to smash the rear window to exit the cabin.

Using the emergency hammer (Option)

1. Pull the emergency hammer from its mounting above the rear window.



⚠ WARNING

FLYING OBJECTS TO FACE HAZARD

Breaking glass may fly into your face and eyes.

Shield your eyes and face with your other arm while breaking the window with the hammer.

2. Smash the rear window with the hammer.
3. Use the hammer to scrape the remaining glass.
4. Exit the cabin through the rear window.

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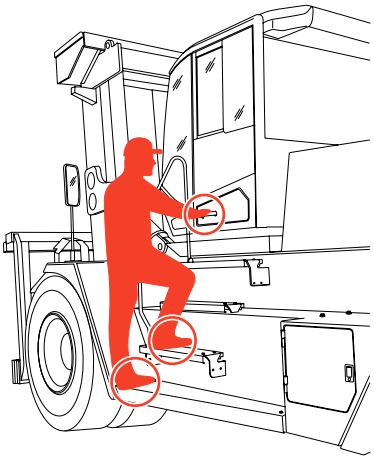
2.5.6 Mounting, and dismounting the machine

⚠ WARNING	
	SLIPPING HAZARD **Failing to maintain three points of contact can cause serious injury or death.** **Maintain three points of contact when mounting, or dismounting the machine. Three points of contact are either two hands, and one foot, or two feet, and one hand.**

NOTE ***Climb on and off only when the machine is stationary.***

NOTE ***Do not jump from the steps to the ground.***

NOTE ***Following this procedure reduces the risk of falling, and decreases wear on back, and knees.***



1. Face the steps, when mounting, or dismounting the machine.
   The cabin entrance is on the left side of the machine.
2. Maintain three points of contact until reaching the cabin, or ground.

2.5.7 Locking the cabin door in open position

1. To fasten the cabin door in open position, open the cabin door and push it into the lock.

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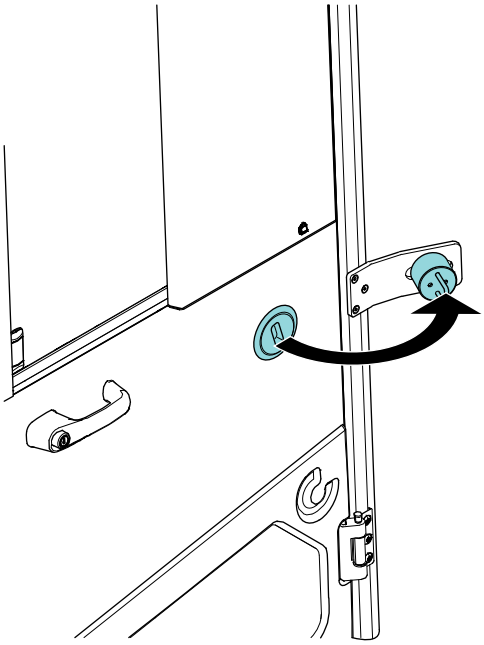
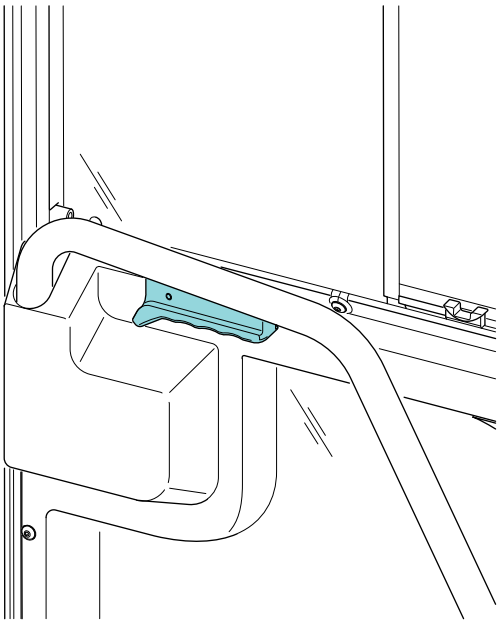


2. To unlock the door from open position, press the handle on the inside of the cabin door.



2.5.8 Personnel requirements

⚠ DANGER

SPECIALIST SKILLS REQUIRED

Incompetent operation and maintenance could cause death or severe injuries.

Operation and maintenance procedures require professional skills and special training regarding the tasks and working methods.

Do not operate the equipment or do any maintenance tasks without proper training. Always follow the instructions. Use appropriate personal protective equipment, depending on the task.

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To avoid hazardous situations and dangerous consequences, leave all operation and maintenance work to authorized personnel. Tasks that are mentioned are examples of tasks which are allowed only for authorized personnel. Instructions for safe handling and other risks that are related to the tasks, can be found in the following chapters. Tasks that require special technical skills and training include, but are not limited to:

1. Hydraulic system maintenance
2. Electric system maintenance
3. Battery maintenance
4. Tire maintenance
5. Changing parameters in the control system

2.6 Environmental information

Environmental impacts have been taken into account when designing and manufacturing this product. To prevent environmental risks during use, follow the instructions and local regulations for disposal of waste material. Proper use and maintenance improve the environmental performance of this product.

2.6.1 Energy consumption

Energy consumption during the use phase has the biggest environmental impact. Diesel fuel is needed for lifting, transporting, lighting, heating, cooling, and other optional components that are part of the machine. Konecranes machines minimize the use of fuel in the following ways:

- Engineering diesel engines with the best possible fuel efficiency and lowest emission levels.
- Engine downsizing.
- Fuel saving transmission features, like lock-up and continuously variable transmission.
- Using load-sensing hydraulic systems, so no hydraulic flow (with resulting energy losses) is created unless it is needed by an actual load command.
- ECO-driving supports the operators so they can minimize fuel consumption by reducing the harshness of operations.
- Connectivity for the operational managers to optimize the use and operational efficiency of their machine fleet by:
  - maximizing time driving with payload
  - minimizing travelling distances over the yard
  - select the most suitable machine capacity for specific lifting needs
  - monitoring the right tire pressure for the lowest rolling resistance in connected machines
- Eliminating idling time with:
  - automatic start and stop
- Means to optimize the preventive maintenance of the machines, to ensure long-term fuel efficiency.

2.6.2 Product lifecycle stages

The environmental impact of a Konecranes machine is taken into account for the whole lifecycle of the vehicle. “Lifecycle” refers to the extraction and processing of raw materials, the production of components, manufacturing, use, and maintenance. "Lifecycle" also refers to disposal of the product and the transportation that is involved from one stage to the next.

Each stage of the lifecycle has a different impact on the environment. The two most significant environmental impacts of the machines are the energy consumption during the use phase (in particular, the effects of diesel emissions) and the raw materials and component production (in particular, the effects of steel production). The significance of energy consumption depends on actual usage, including operating time, efficiency of operations, and load collective.

Product lifecycle stages include:

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- Production of materials and components
- Equipment manufacturing and assembly
- Use phase, including maintenance, repairs, and modernization
- Dismantling and recycling of waste materials
- Transports between each stage

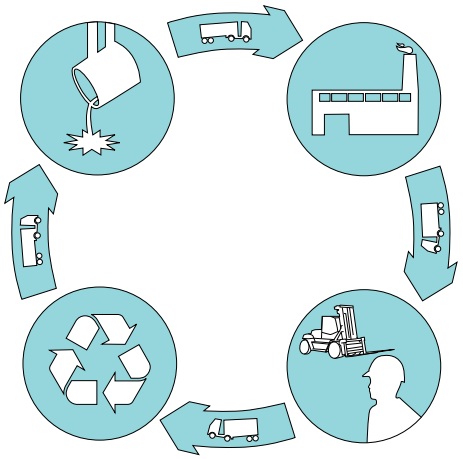

Figure 10. Product lifecycle stages

2.6.2.1 Production of materials and components

84%–92% of machine materials are metals, and rubber tires form 3%–9%. The rest of the materials include electrical and electromechanical components, fluids (hydraulic oil, diesel fuel, and grease), plastic, and glass.

The main raw material is steel. The most significant environmental impacts of steel production are the use of raw materials and energy, as well as carbon dioxide and particle emissions. More than 75% of the steel content can be manufactured from recycled steel scrap.

Lubricants, which are used from factory on the products, are industrial hydrocarbons.

Table 2. Materials used in Konecranes machines

	Konecranes Lift Trucks					Konecranes Liftace		
	Forklift	**Forklift, electric**	**Empty container handler**	**Laden container handler**	**Reach stacker**	**Forklift**	**Empty container handler**	**Reach stacker**
Steel	88%	84%	91%	90%	92%	88%	92%	92%
Rubber	6%	6%	4%	5%	3%	6%	3%	3%
Copper	<1%	<2%	<1%	<1%	<1%	<1%	<1%	<1%
Electronics	<1%	<4%	<1%	<1%	<1%	<1%	<1%	<1%
Fluids	<2%	<2%	<2%	<2%	<2%	<2%	<2%	<2%
Polymers	<1%	<1%	<1%	<1%	<1%	<1%	<1%	<1%
Others	<1%	<1%	<1%	<1%	<1%	<1%	<1%	<1%

2.6.2.2 Equipment manufacturing and assembly

Production mainly involves assembling of machines and some installations. Welding is only carried out for complementing or repair work. Surface treatment for reconditioning is conducted to a lesser extent.

Testing of machines is carried out outdoors after assembly, before delivery.

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The most significant environmental impact is the energy consumption, and diesel emissions during test-driving. To decrease the impact, Konecranes Lift Trucks is using HVO100 bio diesel. It is recommended that HVO100 bio diesel is used generally to decrease the environmental footprint.

There are also some lower impacts from the chemicals that are used, like paints, oils and fuels. The waste from the production is disposed of, according to local regulations. Examples of waste are wood, plastic, and paper as well as hazardous waste such as residue of paint, and waste oil.

2.6.2.3 Use phase, including maintenance and modernization

Most significant environmental impacts of machines are the energy consumption during the use phase (in particular, the effects of diesel emissions). Konecranes machines minimize the use of fuel, as described in "Energy consumption".

Timely repairs and proper maintenance support each machine’s efficiency, safety and, performance which contributes to less environmental impact.

The optional hydraulic long-life (HLL) filter removes small particles, reduces the water in the oil, and extends the life of the hydraulic oil. This filter increases the amount of time between hydraulic oil replacements.

With the option TRUCONNECT® Smart Connected Lift Trucks the customer can plan service on real machine use, which in most situations extend service intervals. A sensor for monitoring the status of the hydraulic oil, and estimate the remaining life of the oil, can also be provided. The monitoring of the hydraulic oil status prevents unnecessary hydraulic oil replacement.

Certain major components like diesel engine, transmission, and some electronics can be restored to like-new condition. Konecranes Service offers restored spare parts, where the old part is requested back (as core unit for later renovation). This restoration process extends the useable machine life and reduced the environmental impact.

2.6.2.4 Dismantling and handling waste material

Konecranes Lifttrucks strive to optimize all packaging to minimize waste and to follow the EU waste hierarchy. The most preferable actions are: prevention, reuse, recycle, burning of material to recover the energy in the material, and as a final resort, safe disposal as landfills.

Waste material from dismantling shall be handled and disposed according to local regulations. As waste regulations and types of available recovery and disposal methods vary regionally, no general detailed guidance can be given.

Dismantling should always be planned and executed by authorized personnel. A local risk assessment must be performed in advance.

Depending on available recovery and disposal methods, wood can be recycled and reused but is the responsibility of the customer. Plastic waste is collected and, depending on the infrastructure, recycled, burned to recover the energy in the material, or as a final resort, safely disposed as landfills.

NOTE ***Always use licensed recycling companies.***

The following list provides proposals for adequate waste handling methods.

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Table 3. Proposed waste handling methods (example for EU states)

Proposed waste handling methods (example of EU states)	
Material	**Handling method**
Metals	Material recycling, multi-metal scrap recycling.
Rubber tires	Recycle rubber according to local regulations. Whenever possible, return the used rubber tires to the tire supplier for recycling.
Electronics and electromechanical components	Some electrical parts may be treated as hazardous waste. Collect and recycle the electronics and electromechanical components separately. Use e-waste management.
Batteries	Batteries and other energy storage components may contain hazardous substances. Collect these items separately and recycle according to local regulations.
Fluids, accumulators, oil filters	Recycling, hazardous waste management
Plastics and polymers	Recycle plastic as material, burn to recover the energy in the material, or deliver it to a landfill site.
Chemicals	Never spill chemicals, such as oil, grease, and other liquids, onto the ground, soil, or sewage. Store waste oil and grease in containers that are indicated for the purpose. More detailed information on chemical handling as waste can be found in the chemical safety data sheet. The data sheet is available from the manufacturer of the chemical.
Packing materials	Reuse or recycle packing materials, such as plastics, wood, and cardboard.
Glass	Recycle glass according to local regulations.

2.6.2.5 Deliveries between each stage

Materials and components are provided by various suppliers worldwide, however steel structure is primarily sourced from local vendors to reduce the transportation need. It is an ethical, environmental, and employee-related principle that is applied.

Shipment of materials to the respective factories is primarily by road transport, and containerized whenever feasible.

Before shipment, each machine is partly dismantled, depending on dimensional and/or weight constraints for road transportation.

The shipment of a machine to local and regional customers is usually by road from the factory. When shipment is to more remote customers or the shipping route involves waterways, sea transport is often involved. By sea, Ro-Ro type ships are used (where the machine drives onto the ship).

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2.6.3 Notice on the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)

Konecranes is fully aware of its obligations under Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH), and under the UK REACH in the United Kingdom. Twice a year the EU publishes a Candidate list of Substances of Very High Concern (“SVHC”) for Authorization. Producers and EU importers/UK importers have the duty to inform their EU/UK customers when a product contains SVHCs in a concentration above 0.1 % weight by weight. Some Konecranes products do include small quantities of SVHCs, such as lead which is typically used in brass and in certain electric components. These cases are exemptions, as there are currently no satisfactory alternatives available for such substances. We are actively searching for alternatives to substitute articles including SVHCs.

For a list of SVHCs, please see
https://www.konecranes.com/about/corporate-responsibility/konecranes-reach-notice.

2.7 Storage information

2.7.1 Storage

The following chapter describes the recommended procedure for storage of machines. To preserve the condition of the stored machine, it must be driven regularly during storage.

Preparation before storage

NOTE ***Before storing the machine, make sure that all required services according to the maintenance schedule are performed.***

NOTE ***Be aware that some points in the storage handling process, must be performed by trained and authorized maintenance personnel.***

NOTE ***If using a pressure washer, never aim the water directly at radiators, air intakes, seals, rubber hoses, or electrical components.***

- Clean the machine
- Perform daily maintenance check, see section "Daily maintenance"
- Run all hydraulic functions and steer cylinders to end position and back again
- Fill the fuel tank before storing the machine
- Charge the battery
- Lubricate the machine, see section "Regular service"
- To prevent corrosion, apply a rust inhibitor to all the metallic surfaces
- To protect the coating from corrosion, touch up painted surfaces
- If possible, store the machine indoors or under a roof
- If stored outside, it is recommended to cover the whole machine

Maintenance during storage

NOTE ***When driving the machine, the engine temperature must reach at least 80 degrees and the transmission must reach at least 65 degrees.***

To preserve the condition of the machine during storage, the following steps must be performed at least once a month.

- Check the battery, charge if needed
- Check for visible leakage under the machine. If needed, tighten all connections before filling any fluid
- Bleed the fuel system, if needed, see section "Bleeding the fuel system"
- Start the machine, and idle to warm up the engine

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- Drive the machine for a while, both forwards and in reverse
- Run all hydraulic functions and steer cylinders to end position and back again
- Before parking the machine again, check the guidelines for "Preparation before storage". Perform the steps, if needed.

Bringing out of storage

- Check for visible leakage under the machine and on the ground.
- Tighten all connections before filling any fluid, if needed
- Perform daily maintenance check, see section "Daily maintenance"
- Lubricate the machine, see section "Regular service"
- Check the battery, charge if needed
- Bleed the fuel system, if needed, see section "Bleeding the fuel system"
- Start the machine, and idle to warm up the engine
- When the engine has reached the required temperature, and while idling, check for visible oil, fuel, or coolant leakage
- Test drive the machine, to make sure all systems function properly

2.7.2 Alternative storage, up to two months

The following chapter describes the procedure for storage of machines that cannot be accessed or driven during storage.

NOTE ***This way of storing the machine should only be used if necessary. See section "Storage" for the recommended procedure.***

Preparation before storage

NOTE ***Before storing the machine, make sure that all required services according to the maintenance schedule are performed.***

NOTE ***Be aware that some points in the storage handling process, must be performed by trained and authorized maintenance personnel.***

NOTE ***If using a pressure washer, never aim the water directly at radiators, air intakes, seals, rubber hoses, or electrical components.***

- Clean the machine
- Perform daily maintenance check, see section "Daily maintenance"
- Run all hydraulic functions and steer cylinders to end position and back again
- Fill the fuel tank
- Fill up the windshield washer fluid
- Fill the AdBlue/DEF tank, if applicable
- Charge the battery
- Lubricate the machine, see section "Regular service"
- To prevent corrosion, apply a rust inhibitor to all the metallic surfaces
- To protect the coating from corrosion, touch up painted surfaces
- If possible, store the machine indoors or under a roof
- If stored outside, it is recommended to cover the whole machine

Bringing out of storage

- If applicable, remove the cover from the machine
- Check for visible leakage under the machine and on the ground.
- Tighten all connections before filling any fluid, if needed
- Perform daily maintenance check, see section "Daily maintenance"
- Lubricate the machine, see section "Regular service"
- Check the battery, charge if needed
- Bleed the fuel system, if needed, see section "Bleeding the fuel system"
- Check the condition of all rubber hoses, and retighten the hose clamps if necessary
- Check that no oil, fuel, or coolant leakage occurs
- Start the machine, and idle to warm up the engine

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- When the engine has reached the required temperature, and while idling, check for visible oil, fuel, or coolant leakage
- Run all hydraulic functions and steer cylinders to end position and back again
- Check for visible leakage also when using the hydraulic functions after storage
- Test drive the machine, to make sure all systems function properly

2.7.3 Alternative storage, longer than two months

The following chapter describes the procedure for storage of machines that cannot be accessed or driven during storage.

NOTE ***This way of storing the machine should only be used if necessary. See section "Storage" for the recommended procedure.***

Preparation before storage

NOTE ***Before storing the machine, make sure that all required services according to the maintenance schedule are performed.***

NOTE ***Be aware that some points in the storage handling process, must be performed by trained and authorized maintenance personnel.***

NOTE ***If using a pressure washer, never aim the water directly at radiators, air intakes, seals, rubber hoses, or electrical components.***

NOTE ***When performing the regular service, also consider the procedure for conserving the machine.***

- Clean the machine
- Perform maintenance service according to the 500 hours schedule, see section "Regular service"
- Run all hydraulic functions and steer cylinders to end position and back again
- Apply a long-term rust inhibitor to the cylinder pistons
- Drain any water and contamination from the fuel filters and fuel tank
- Fill the fuel tank
- Fill up the windshield washer fluid
- Fill the hydraulic tank completely, to avoid corrosion above the maximum level
- Empty the AdBlue/DEF tank, if applicable, and rinse it with distilled water
- Disconnect, and charge the battery
- Store the battery in a safe way
- Loosen the fan belt
- To prevent corrosion, apply a long-term rust inhibitor to all the metallic surfaces
- To protect the coating from corrosion, touch up painted surfaces
- Conserve the machine, see section "Conservation of the lubrication and fuel system"
- Cover the air filter, exhaust pipe, and engine if necessary
- If possible, store the machine indoors or under a roof
- If stored outside, it is recommended to cover the whole machine

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Conservation of the engine and fuel system

⚠ WARNING

RISK OF FIRE AND PERSONAL INJURY

Conservation oils are flammable and are dangerous to inhale.

Ensure good ventilation. Use a face mask when applying the conservation oil.

- Drain the engine oil and fill with conservation oil just over the MIN marking on the dipstick
- Connect the fuel suction and return hoses to a fuel can (app. 20 l) containing 1/3 conservation oil and 2/3 diesel fuel
- Bleed the fuel system, see section "Bleeding the fuel system"
- Start the engine and idle until about 2 l of the fluid in the fuel can have been used
- Stop the engine and reconnect the fuel suction and return lines to the machine
- Drain the excess fluid from the engine, see section "Cleaning and draining the fuel tank, all engines"
- Put a note on the machine with the date, type of conservation and the conservation oil used

Bringing out of storage

- If applicable, remove the cover from the machine
- Remove covers from air intake systems and exhaust systems
- Remove the rust inhibitor
- Check for visible leakage under the machine and on the ground.
- Tighten all connections before filling any fluid, if needed
- Check and adjust the hydraulic oil level, remove excess oil
- Charge and reconnect the battery
- Tighten the fan belt
- Fill the AdBlue/DEF tank, if applicable
- Perform maintenance service according to the 500 hours schedule, see section "Regular service"
- Lubricate the machine, see section "Regular service"
- Bleed the fuel system, if applicable, see section "Bleeding the fuel system"
- Check the condition of all rubber hoses, and retighten the hose clamps if necessary
- Check that no oil, fuel, or coolant leakage occurs
- Start the machine, and idle to warm up the engine
- When the engine has reached the required temperature, and while idling, check for visible oil, fuel, or coolant leakage
- Run all hydraulic functions and steer cylinders to end position and back again
- Check for visible leakage also when using the hydraulic functions after storage
- Test drive the machine, to make sure all systems function properly

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3 PRODUCT DESCRIPTION

3.1 Technical description

Specification SMV 33-1200C means:

- SMV = Product name
- 33-1200 = 33-ton lifting capacity on 1200-mm load center
- C = Model C

Engine

The engine is a water-cooled, turbo-charged diesel engine. The engine drives a transmission using a torque converter.

Transmission

The transmission is of power declutch type. The transmission is equipped with an oil cooler. On the brake pedal in the cabin, there is a declutch switch. The declutch switch disengages the transmission so that the operator can control the hydraulics while maintaining a high engine RPM during stacking maneuvers.

Axles

Drive axle

The transmission uses a universally jointed propshaft to drive the drive axle.

The drive axle is of the heavy-duty double reduction type. The primary reduction is through the hypoid crown wheel and a pinion. The secondary reduction is achieved by a planetary gear that is set within the wheel hubs. The wheel hubs are carried on tapered roller bearings.

Steer axle

The steer axle is mounted in sphere-elastic bushes which allow sufficient wheel movements for stability on uneven ground. The parallel steering links are between the steer cylinder and the spindles.

Brakes

Service brake

The service brakes are controlled by the foot brake pedal, which activates the brakes in the drive axle. An oil-cooled wet disc brake system are used for the brakes.

Parking brake

The parking brake is controlled electrically and activates a hydraulic cylinder. The hydraulic cylinder acts on a brake disc that is mounted between the drive axle and the propshaft. The parking brake is spring applied and uses the hydraulic pressure to release.

Hydraulic system

The hydraulic system is equipped with load-sensing variable piston pumps. The brake system is equipped with one or two gear pumps.

Steering

The steering is fully servo-assisted.

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Control valve

Machine sizes 10-16 are equipped with the L90 control valve, and machine sizes 18-60 with the K220/L90 control valve. The control valve is mounted on the chassis. The operator controls the valve by either levers or a joystick. The valve regulates the functions for mast lifts, tilts, and attachment, and any optional functions.

Mast

The duplex standard mast consists of:

- One outer mast
- One inner mast
- One fork carriage
- Two lift cylinders
- Two tilt cylinders

The inner mast section moves along the outer section using mast wheels and support rollers. The mast is mounted on two axles in the chassis using bearings. The fork carriage is of a rolling type with sideshift movement and fork positioning.

Operator's cabin

The operator’s cabin fulfills international safety standards, and is rubber-mounted to protect the operator from vibrations. Entrance to the cabin is on the left side using the steps on the machine. The cabin air is efficiently filtered to ensure a healthy work environment.

Instruments and controls

The hydraulic control levers, or the joystick, and the display are on the right-hand side of the operator’s seat. The gear switch is on the left side of the control levers, or at the back of the joystick.

The control for windshield wipers, ceiling light, and any optional functions are on the keypad. The indicator lamps for the hazard lights, parking lights, and the rotating beacon are on the armrest, on the right-hand side of the keypad.

For more information, see "Keypad", "Controls and indicators in cabin", and "Lifting loads".

Electrical system

The electrical system is 24 V.

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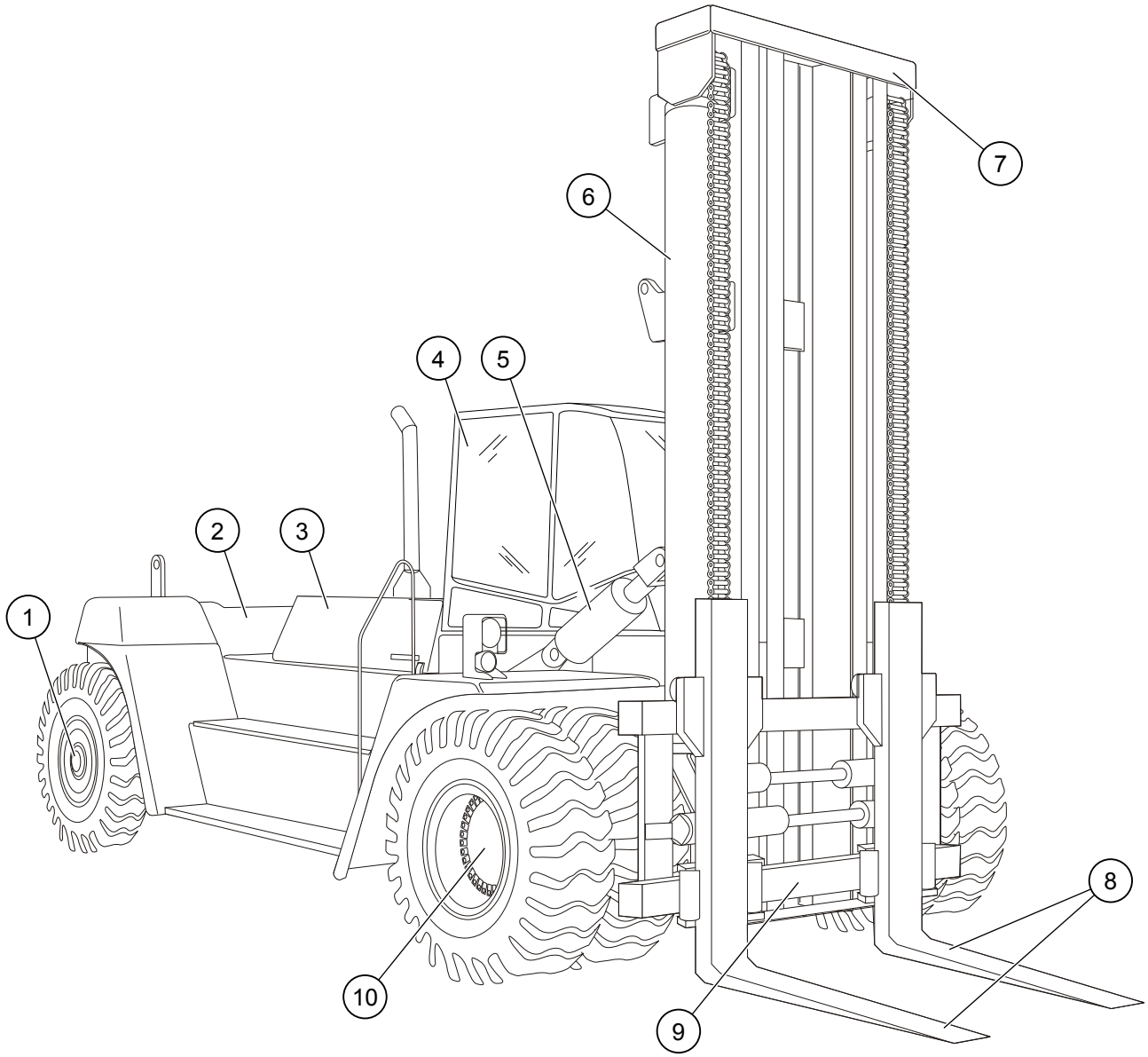
3.2 Machine outline, forklift



1. Steer axle
2. Counterweight
3. Engine hood
4. Operator's cabin
5. Tilt cylinder
6. Lift cylinder
7. Mast
8. Forks
9. Fork carriage
10. Drive axle

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3.3 Controls and indicators in cabin with lever control

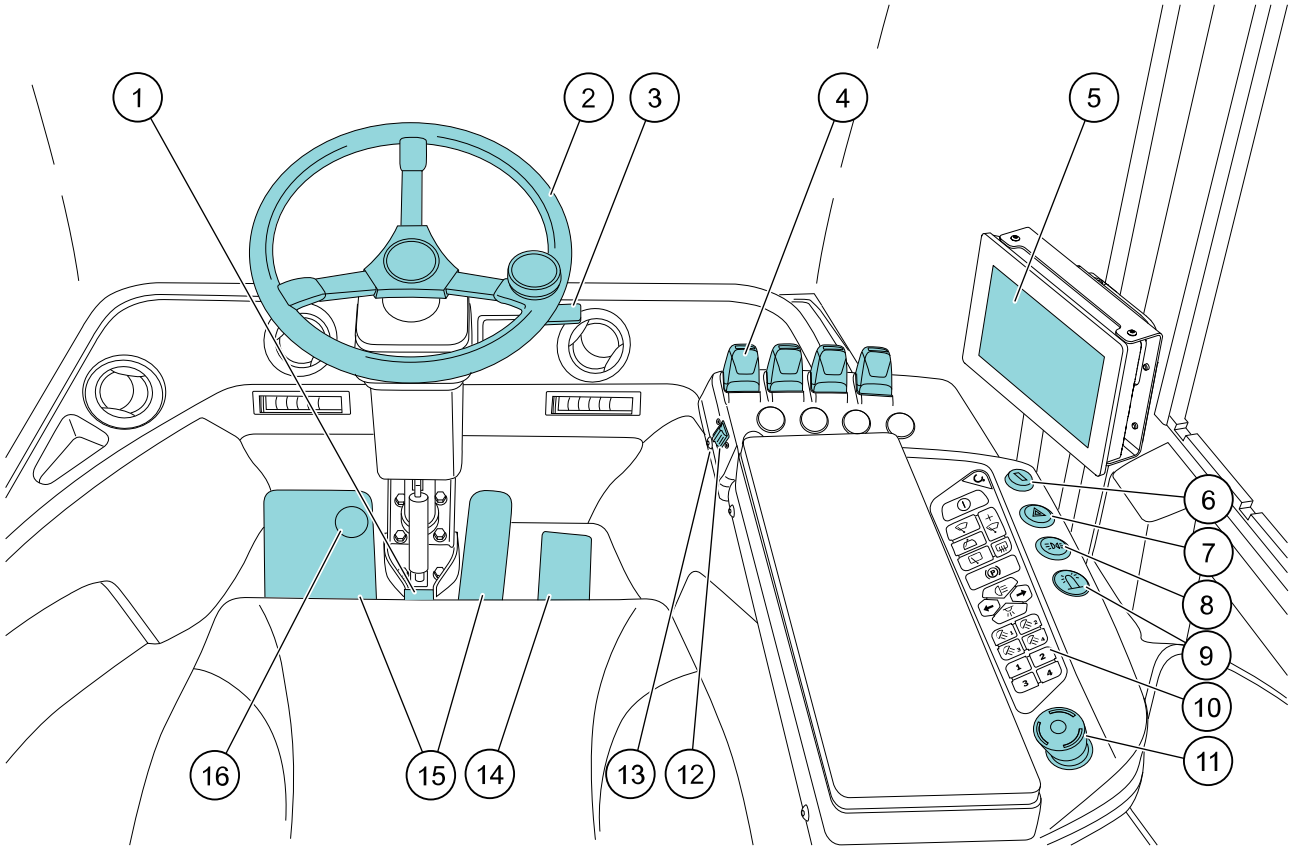

Figure 11. Controls and indicators in cabin with lever control

1. Adjustment pedal for the steering wheel column
2. Steering wheel
3. Adjustment lever for tilting the steering wheel
4. Control levers for the hydraulics
5. Display
6. Ignition key switch
7. Hazard light
8. Position lights
9. Rotating beacon (option)
10. Keypad
11. Emergency stop
12. Gear switch for forward, neutral, and reverse
13. Horn
14. Accelerator pedal
15. Brake pedal
16. Declutch

The position of controls may vary from machine to machine depending on the customer order.

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3.4 Controls and indicators in cabin with joystick (option)

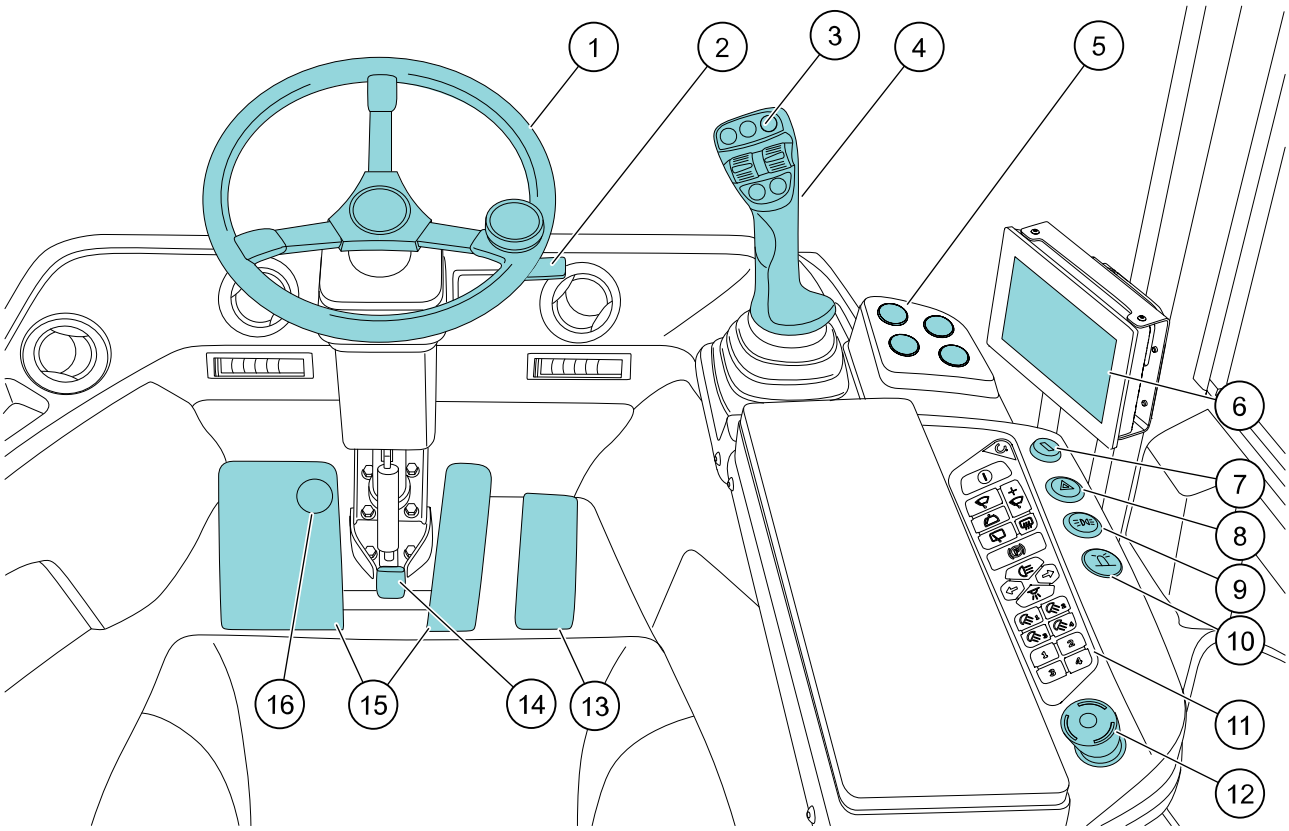

Figure 12. Controls and indicators in cabin with joystick (option)

1. Steering wheel
2. Adjustment lever for tilting the steering wheel
3. Horn activation
4. Gear switch for forward, neutral, and reverse
5. Buttons for optional functions
6. Display
7. Ignition key switch
8. Hazard lights
9. Position lights
10. Rotating beacon (option)
11. Keypad
12. Emergency stop
13. Accelerator pedal
14. Adjustment pedal for the steering wheel column
15. Brake pedal
16. Declutch

Position of controls may vary from machine to machine depending on the ordered options.

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3.5 Keypad

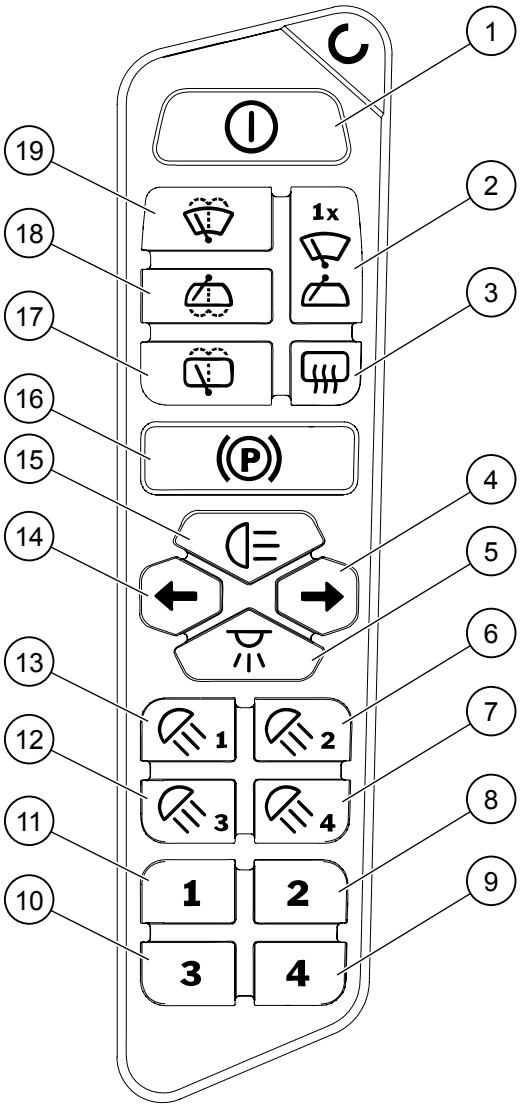

Figure 13. Keypad

1. Start and stop engine
2. Wiper one-stroke
3. Rear window defroster
4. Turn signal indicator, right
5. Cabin interior light
6. Work light for attachment
7. Extra work light
8. Option 2 (not in use)
9. Option 4 (not in use)
10. Option 3 (not in use)
11. Option 1 (not in use)
12. Extra work light
13. Work light for mast
14. Turn signal indicator, left
15. Main beam headlights
16. Parking brake
17. Rear window wiper, push, and hold down for washer [1)]
18. Roof window wiper, push, and hold down for washer [1)]
19. Windshield wiper, push, and hold down for washer [2)]

[1)] intermittent/second speed/off

[2)] intermittent/first speed/second speed/off

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3.6 MD4 display

Figure 14. MD4 touch display

The display has a user-friendly touch interface: to navigate between views, you simply tap on the screen. With the display, you can monitor the hydraulics system and drive line with the help of analog and digital signals from various sensors. It gives you a complete overview of the activities of the machine during operation.

The active keypad function is shown at the bottom-left corner.

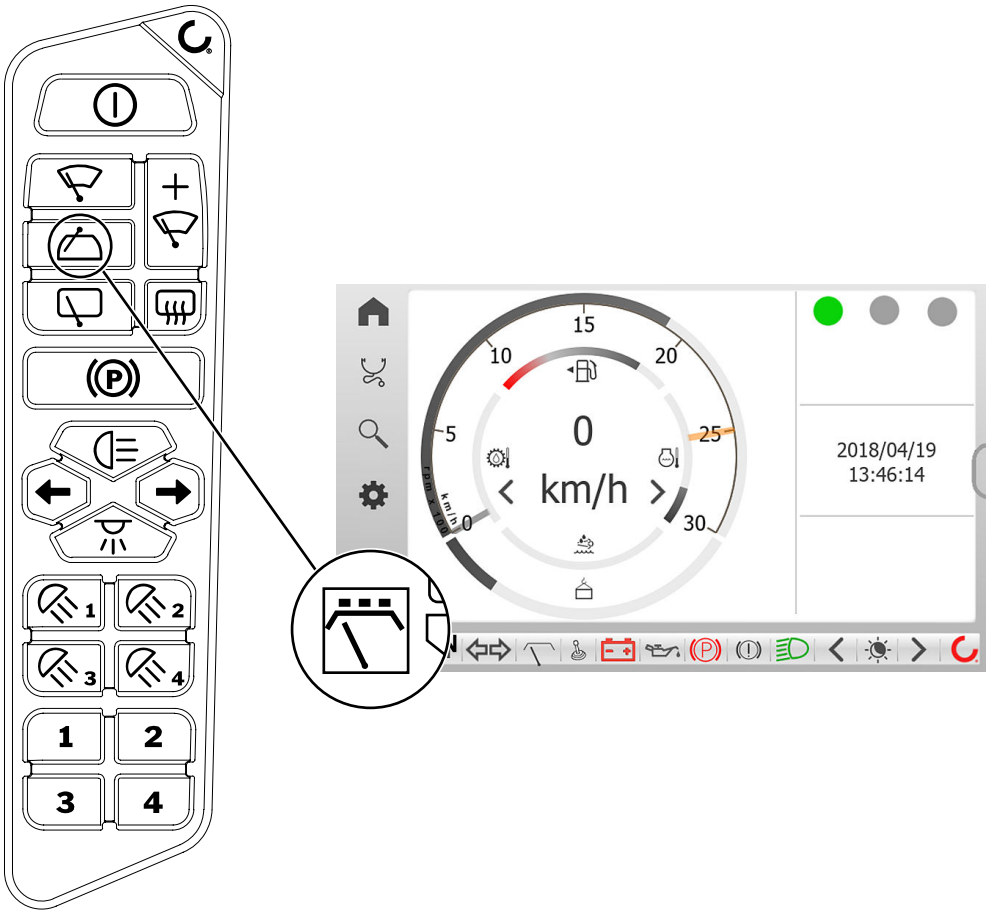

Figure 15. Example of active keypad function: roof window wipers, intermittent

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3.6.1 User interface

3.6.1.1 Introduction to MD4 pages

The MD4 pages can be accessed by clicking on the touch screen display icons. They show various data needed during operation and allow the operator to change required settings.

The operator's menu is only available from the main pages.

There are five main pages:

- **Home** page (weight page)
- **Date and time** page
- **Attachment settings**page
- **ECO-driving** page
- **Operator** page

3.6.2 MD4 display frame

The MD4 display frame is always visible, except in the settings pages. This makes it easy to navigate in the system.

Figure 16. MD4 frame icons

1. Home page (Main page number 1 – Weight page)
2. Machine overview page
3. Information page
4. Settings page
5. Main page number (only visible on the Main pages)
6. Previous Main page
7. Adjust display brightness
8. Next Main page
9. Operator's menu (only available on the Main pages)

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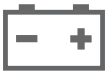
Left side of the MD4 display frame

Using the left-side frame icons, you can return to the **Home page** and access **Machine overview page**, **Information page,** and **Settings page**.

Icon	Meaning
	Home page (Main page number 1 – Weight page)
	Machine overview page shows engine fluid data and gives access to transmission page, engine page, and tire pressure monitoring page.
	Information page shows various counters, such as container counter and time to next service.
	Settings page allows you to view and edit settings and to calibrate all functions. Only service personnel are allowed to modify the settings, a service code is required.

Bottom of the MD4 display frame

The bottom of the MD4 display shows operator control and engine status symbols. The symbols are gray when the function is not on or the status is normal. From the bottom frame, you can also cycle between the five **Main pages** by tapping the left and right arrows. The **Main page** currently in view is shown in the bottom-left corner.

Symbol	Meaning
N	Neutral gear is selected
F	Forward gear is selected
R	Reverse gear is selected
	The turn signal blinks green when you press the turn signal button
	Red when the battery voltage level is low
	Red when the engine oil pressure is low
	Fasten seat belt indicator

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Symbol	Meaning
	Red when the parking brake is on
	Red when the accumulator pressure is low
	Green when the low beam is on
	Blue when the high beam is on
	Tap to go to the previous Main page
	Tap to change the display brightness
	Tap to go to the next Main page
	Windshield wipers
	Windshield wipers, slow
	Windshield wipers, fast
	Windshield wipers, intermittent
	Rear window wipers
	Rear window wipers, intermittent
	Rear defroster
	Roof and rear washer
	Roof window wipers

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Symbol	Meaning
	Roof window wipers, intermittent
	Cabin interior light
	Working light
	Electrical lever / mini-wheel steering (option) active

Right side of the MD4 display frame

When viewing any of the five **Main pages** (either **Home/Weight, Date and time, Attachment, ECO-driving,** or **Operator page**), the MD4 display shows a button on the right side of the frame. By tapping this button, you can access the **Operator's menu**.

Symbol	Meaning
	Operator's menu

The MD4 display frame is always visible, except in the settings pages. This makes it easy to navigate in the system.

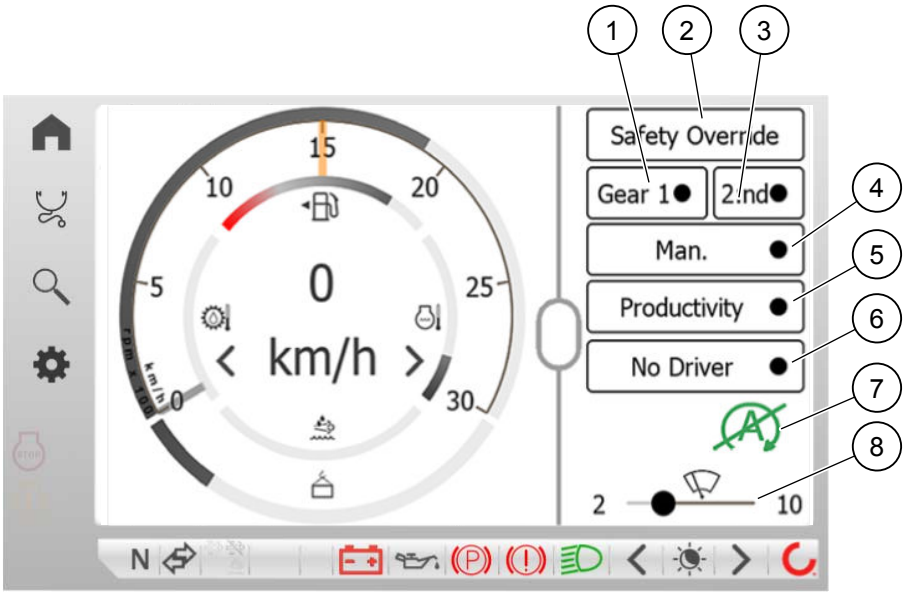

Figure 17. Operator's menu

1. Select top gear
2. Safety override for the twistlock on the attachment
3. Starting gear
4. Automatic or manual gear selection
5. Eco mode or productivity mode
6. Operator login (option)
7. Autostop function (option): the symbol is visible if the machine has the autostop function. Press the symbol to disable the autostop function for 2 min.
8. Intermittent wiper

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3.6.3 MD4 pages

3.6.3.1 Start-up page

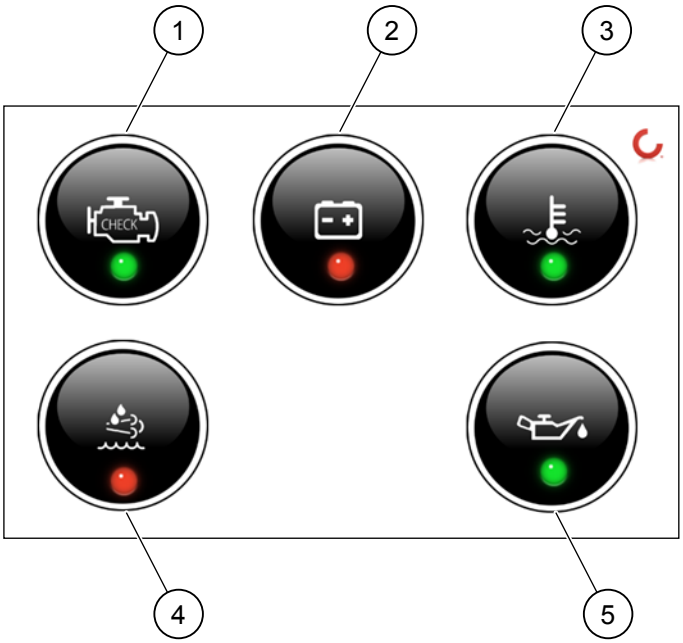

Figure 18. Start-up page

1. Engine check
2. Battery check
3. Engine coolant check
4. AdBlue check
5. Engine oil check

The **Start-up** page is displayed when you start the machine. After 10-15 seconds, it changes automatically to the **Main page** viewed the last time the machine was on. Green light indicates normal status, red light indicates error.

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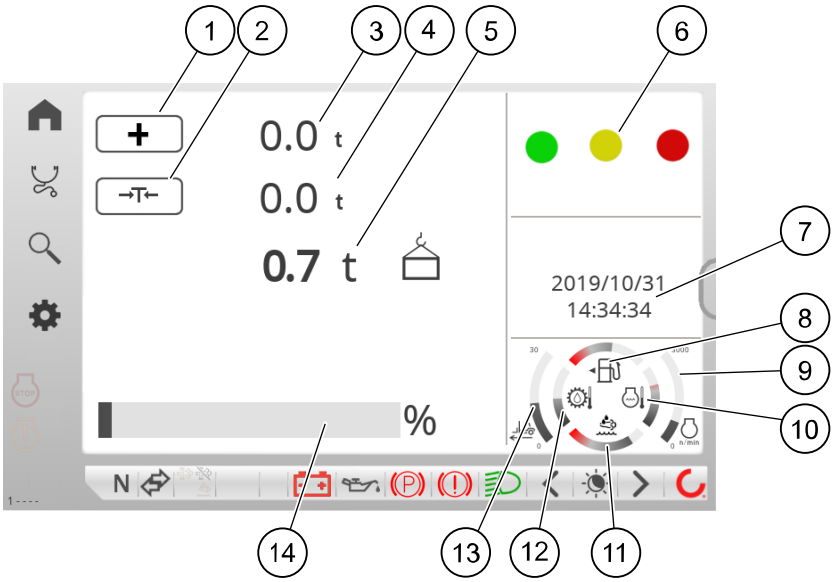
3.6.3.2 Home page (weight page)

Main page 1



1. Add weight (option)
2. Tare (option)
3. Last load (option)
4. Total load (option)
5. Current load (option)
6. Twistlock indication (if applicable)
7. Date and time
8. Fuel level
9. Engine RPM
10. Engine coolant water temperature
11. AdBlue level
12. Transmission oil temperature
13. Driving speed
14. Percentage of maximum load

NOTE ***Calibrating the weight scale can only be done by authorized service personnel.***

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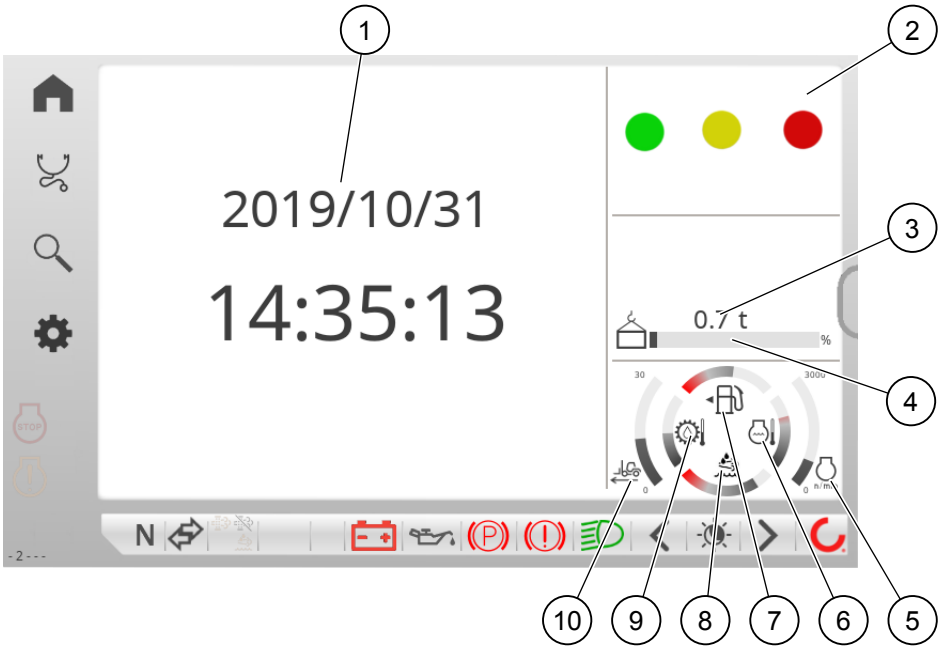
3.6.3.3 Date and time page

Main page 2



1. Date and time
2. Twistlock indication (if applicable)
3. Current load
4. Percentage of maximum load
5. Engine RPM
6. Cooling water temperature
7. Fuel level
8. AdBlue level
9. Transmission oil temperature
10. Driving speed

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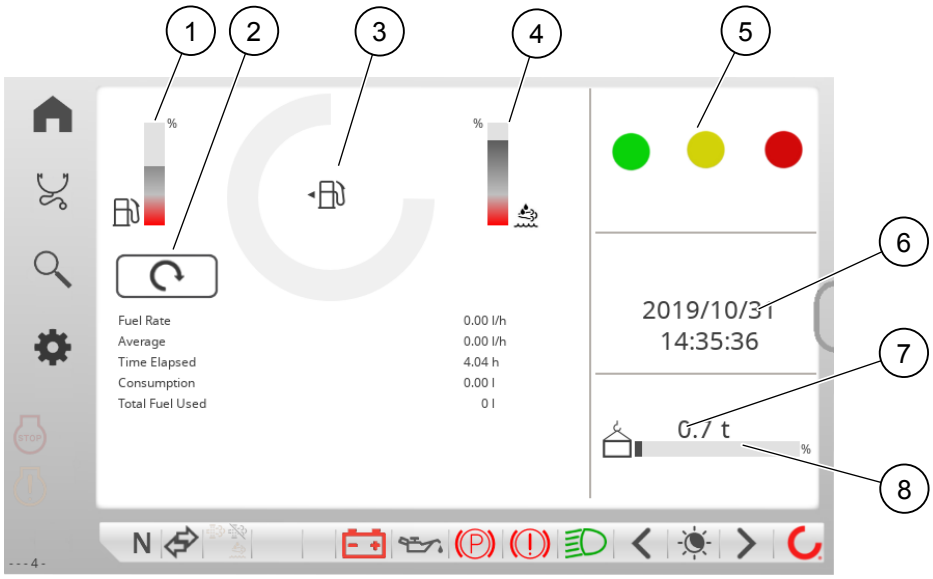
3.6.3.4 ECO-driving page

Main page 4



1. Fuel level
2. Resets the following values:
   - Fuel rate: current hourly fuel consumption
   - Average: average hourly fuel consumption
   - Time elapsed: time since last reset
   - Consumption: fuel consumption since last reset
3. Fuel economy bar: red in the bar indicates less economic driving style, gray indicates more economic driving style
4. AdBlue level
5. Twistlock indicators (if applicable)
6. Date and time
7. Current load (option)
8. Percentage of maximum load

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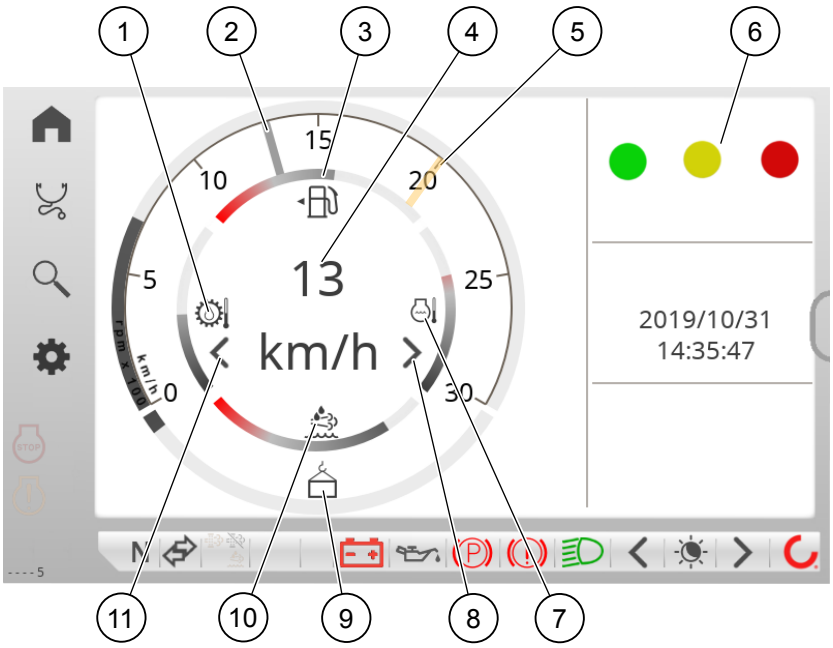
3.6.3.5 Operator page

Main page 5



1. Transmission oil temperature
2. Driving speed
3. Fuel level
4. In-focus value (adjustable)
5. Speed limiter (option)
6. Twistlock indication (if applicable)
7. Engine coolant temperature
8. Next in-focus value
9. Current load in percentage
10. AdBlue level
11. Previous in-focus value

The in-focus value can show the following values:

- Driving speed
- Weight in percentage
- Weight in tons (option)
- Transmission oil temperature
- Fuel level
- Engine coolant temperature
- Engine RPM

Use the left (11) and right (8) arrow to cycle between the options.

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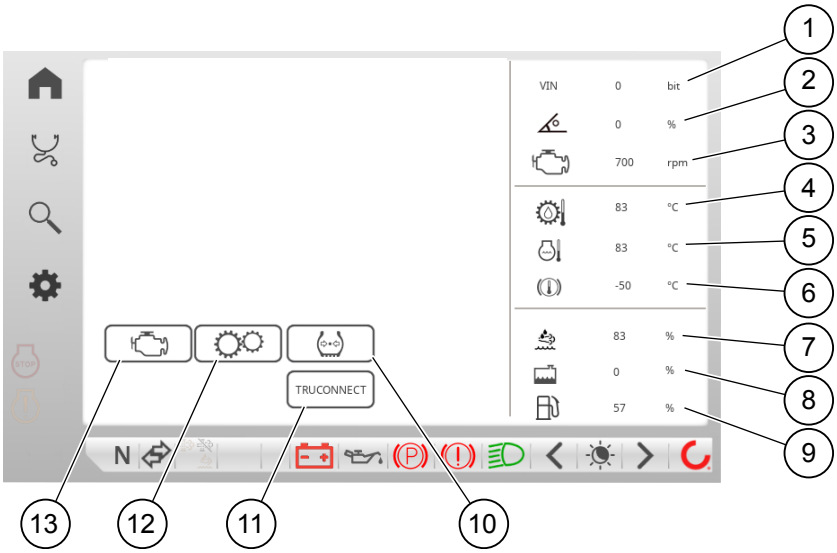
3.6.3.6 Machine overview page

NOTE ***The visible content of the Machine overview page may vary depending on ordered options.***



The **Machine overview page** gives access to engine data, transmission data, tire pressure monitoring, and several other diagnostics pages.

1. Raw value from accelerator pedal
2. Accelerator pedal angle 0%–100%
3. Engine RPM
4. Transmission oil temperature
5. Engine coolant temperature
6. Brake oil temperature
7. AdBlue level, if applicable
8. Engine coolant level
9. Fuel level 0%–100%
10. Tire pressure monitoring page (option) (1)
11. Access to TRUCONNECT® statistics page (option)
12. Transmission diagnostics page
13. Emission page

(1) Only visible if you have entered the service code.

Engine diagnostics

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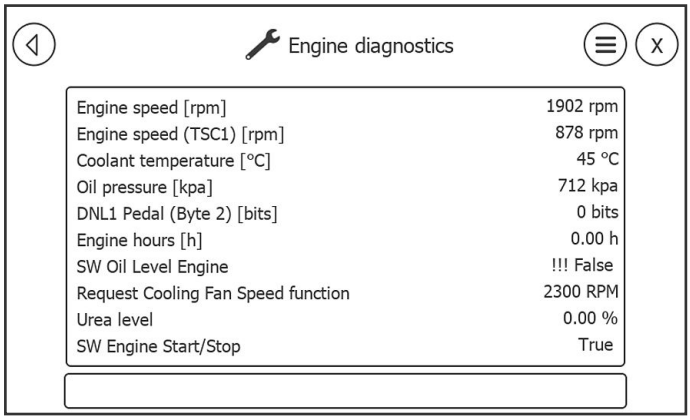

The menu button in the top-right corner allows you switch between **Scaled** and **Raw values** for the measurements.

Table 4. Measurements for engine diagnostics

Measurement	Meaning
Engine RPM	Actual engine RPM.
Engine RPM TSC1 [rpm]	Requested engine RPM.
Coolant temperature [°C]	The temperature of the engine coolant.
Oil pressure [kPa]	Engine oil pressure.
DNL1 Pedal (Byte 2) [bits]	Request to Scania engine for auto engine acceleration.
Engine hours	Not used for reading machine hours.
SW Engine level engine	Special option for Scania engine.
Request cooling fan speed function	Requested cooling fan RPM from machine.
Urea level	Urea/AdBlue level in %.
SW Engine start/stop	Start request signal (engines with CAN bus start).

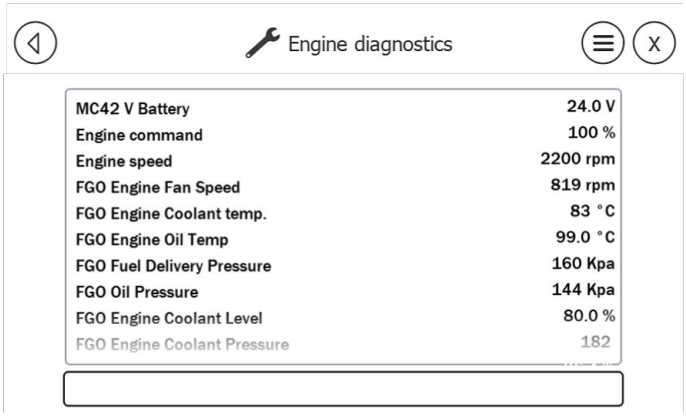

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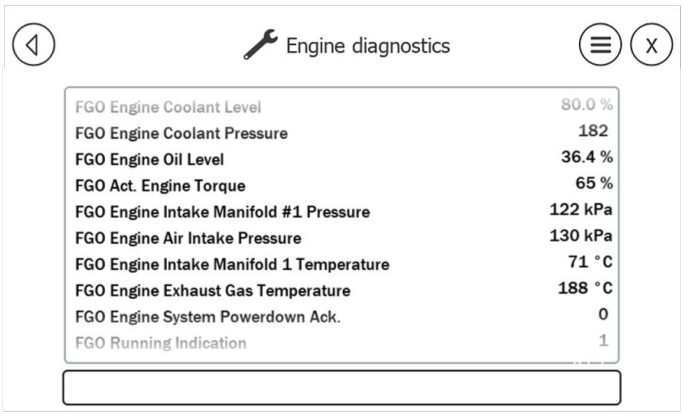
Table 5. Measurements for engine diagnostics

Measurement	Meaning
MC42 V Battery	24 V. Power voltage supply to MC42 unit.
Engine command	This value is the requested engine RPM. Depending on the action being performed, for instance, when accelerating or using a lifting function, the percentage can vary: 0% is approximately 700 rpm and 100% 2200 rpm.
Engine RPM [rpm]	The actual engine RPM in rpm.
FGO Engine Fan Speed	The actual speed of the engine fan in rpm. This speed depends on the engine temperature, as the fan speed varies according to the engine temperature.
FGO Engine Coolant temp.	The temperature of the engine coolant, more than 102 C is too high. (Warning at 105 C on Volvo engines)
FGO Engine Oil Temp.	The temperature of the engine oil. If the temperature is too high, the system sends an error message. (Warning at 125 C on Volvo engines)
FGO Fuel Delivery Pressure	Gage pressure of fuel in system as delivered from supply pump to the injection pump.
FGO Oil Pressure	Gage pressure of oil in engine lubrication system as provided by oil pump. When the pressure is less than 100 Kpa, it is too low, and causes the system to send an error message.
FGO Engine Coolant level	Should be above minimum level. The sensor indicates if the level is too low.



Measurement	Meaning
FGO Engine Coolant pressure	Gage pressure of coolant in engine cooling system.
FGO Engine Oil Level	Ratio of volume of oil found in engine lubrication system to total lubrication system volume. Never fill the engine oil to 100%.
FGO Act. Engine Torque	The calculated output torque of the engine.

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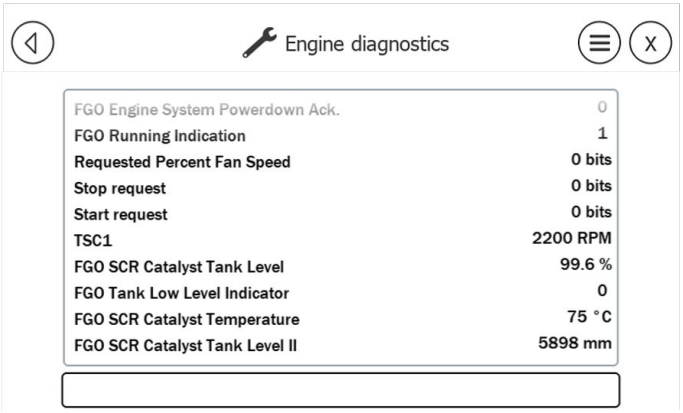
Measurement	Meaning
FGO Engine Intake Manifold #1 Pressure	The gage pressure measurement of the air intake manifold #1.
FGO Engine Air Intake Pressure	Absolute air pressure at inlet to intake manifold or air box. If the filter is clogged, the system sends the operator an error message.
FGO Engine Intake Manifold 1 Temperature	Temperature of pre-combustion air found in intake manifold number 1 of engine air supply system.
FGO Engine Exhaust Gas Temperature	Temperature of combustion by-products leaving the engine.
FGO Engine System Powerdown Ack	Whether engine can be powered down. 0 Power off not allowed (cannot power off), 1 is Power off allowed, 2 is error state, 3 is not available.



Measurement	Meaning
FGO Running Indication	Indicates whether engine running or stopped. 0 is stopped, 1 is running, 2 is reserved, 3 is not available.
Requested Percent Fan Speed	Fan speed as a ratio of the actual fan drive (current speed) to the fully engaged fan drive (maximum fan speed).
Stop request	Engine stop request: 0 is inactive, 1 is active, 2 is error indication, 3 is not available.
Start request	Engine start request: 0 is inactive, 1 is active, 2 is error indication, 3 is not available.
TSC1	The TSC1 message can be used to request speed/ torque instead of the VP70 message.
FGO SCR Catalyst Tank Level	AdBlue tank level. Measured in %,
FGO Tank Low Level Indicator	Indication that the AdBlue tank level is low.

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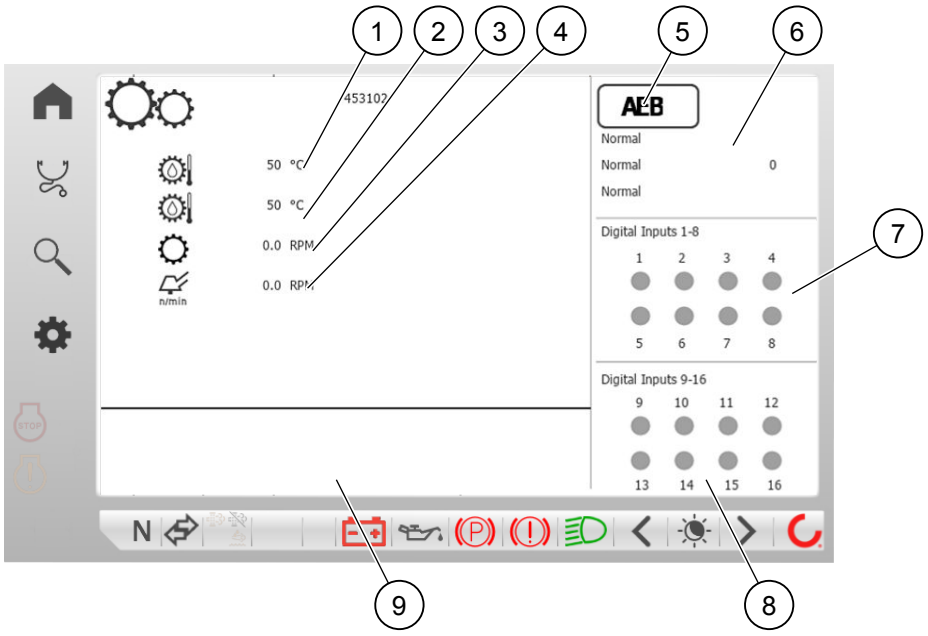
Measurement	Meaning
FGO SCR Catalyst Temperature	Temperature of the AdBlue solution in the storage tank.
FGO SCR Catalyst Tank level [mm]	Measured in mm3, AdBlue tank level.

ZF transmission

Machine overview > ZF transmission



1. Temperature of the converter out oil temperature
2. Temperature of the sump oil temperature
3. Engine RPM from transmission
4. Output shaft RPM
5. AEB button to start calibration
6. Status of transmission calibration
7. Digital input 1-8 on-off
8. Digital input 9-16 on-off
9. Transmission status and fault information

NOTE ***Transmission calibration can only be done by service personnel.***

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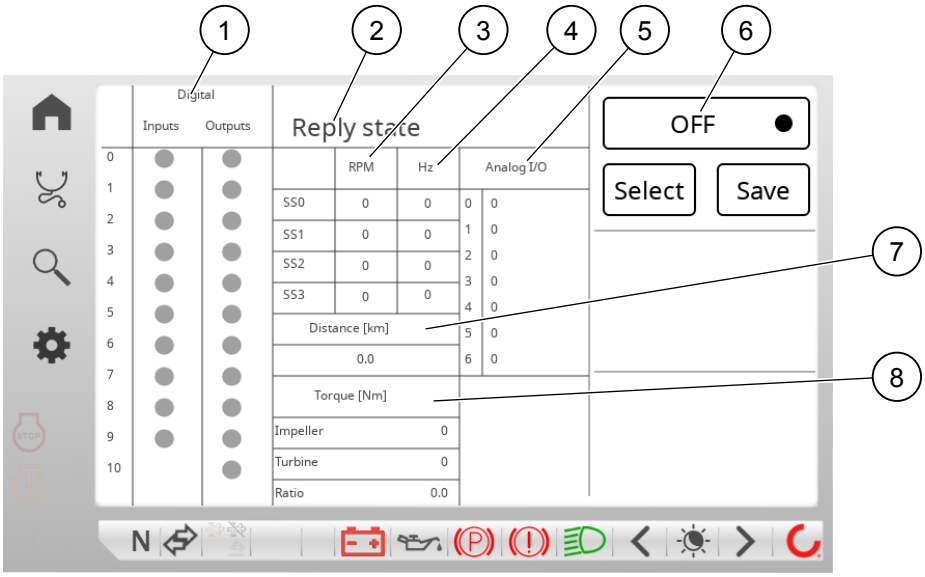
DANA transmission

Machine overview > DANA transmission



1. Digital inputs and outputs of the transmission, 0-9 and 0-10
2. State selected in (6)
3. Value in RPM from the speed sensors
4. Value in Hz from the speed sensors
5. Information about analog inputs and outputs
6. Transmission drop-down menu (selection of various measurements and other actions)
7. Shows traveled distance in [km]
8. Converter torque and ratio difference between impeller and turbine

NOTE ***To access menu (6), a service code is required.***

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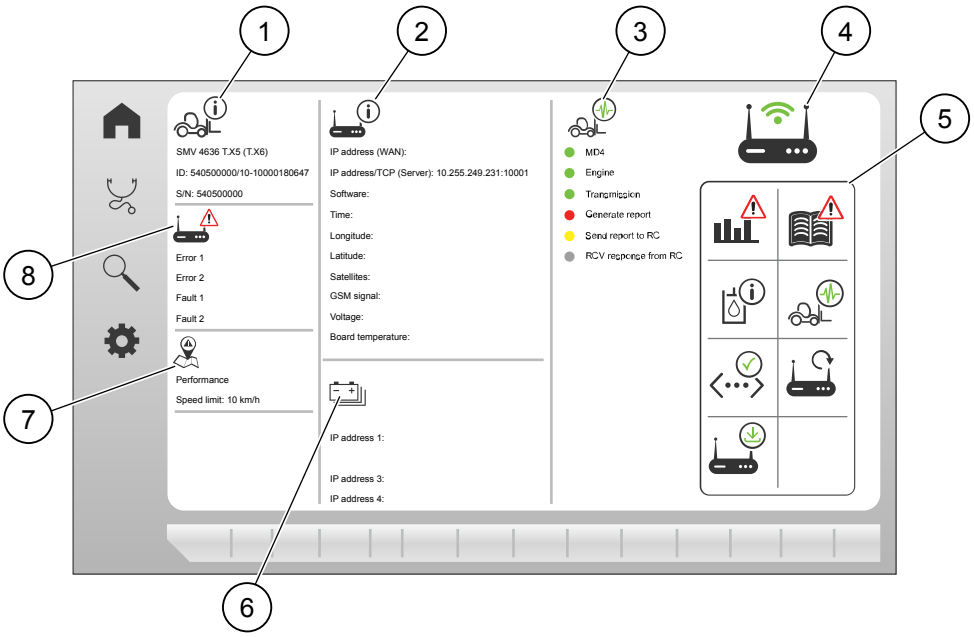
Truconnect page

NOTE ***Options, and values shown in the display illustration, are examples, and varies depending on the model.***

Machine overview > TRUCONNECT page



1. Machine specific information
2. Modem specific information
3. Data log test button
4. Modem operation mode
   - Green = Status OK
   - Yellow, flashing = Booting
   - Red = Fault
5. Available functions (see separate table)
6. Battery connectivity information (if applicable)
7. Geofencing related information
8. Active faults or errors on modem

Available functions	
Button	**Function**
	Button for opening the measure group for alarms related to the modem.
	Button for accessing the log for alarms related to the modem.
	Button for opening the **Hydraulic oil quality** page.

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Available functions	
Button	**Function**
	Button for initiating the data log test. The data log test verifies that: • all required data from the MD4, the engine, and the transmission is available. • the data logging reports can be generated successfully. • reports can be sent to the Truconnect database successfully. • the Truconnect database was able to successfully process the generated report.
	Button for initiating the communication test. The communication test verifies that: • the GPRS/3G connection can be opened. • route to the Truconnect database is available. • a connection to the Truconnect database can be established. • the modem can register to the Truconnect database. • the RMP (Regatta Messaging Protocol) connection to the database works. • the time synchronization with NTP sever works. • that the GPS location is available.
	Button for rebooting the modem.
	Button for updating the modem software.

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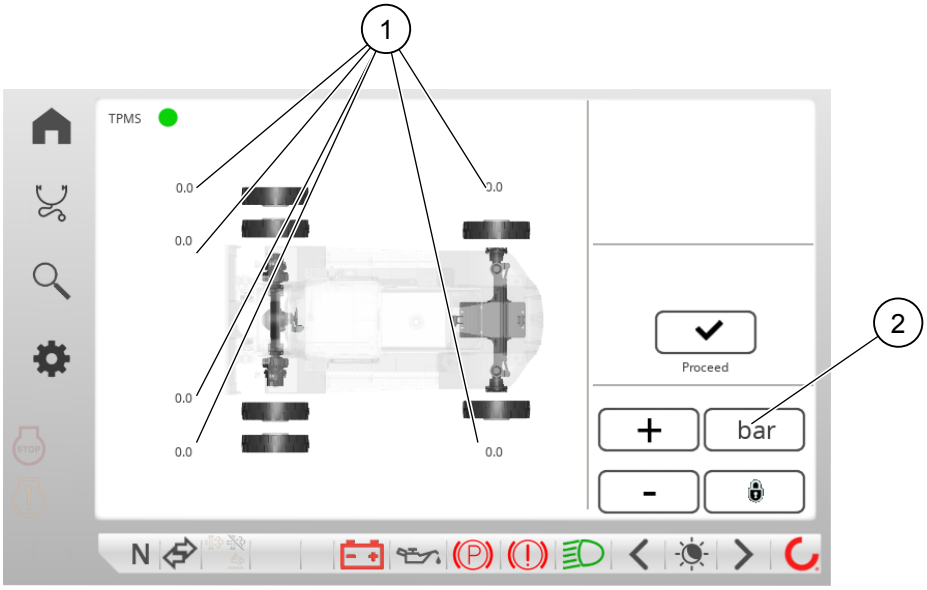
Tire pressure monitoring system page (option)

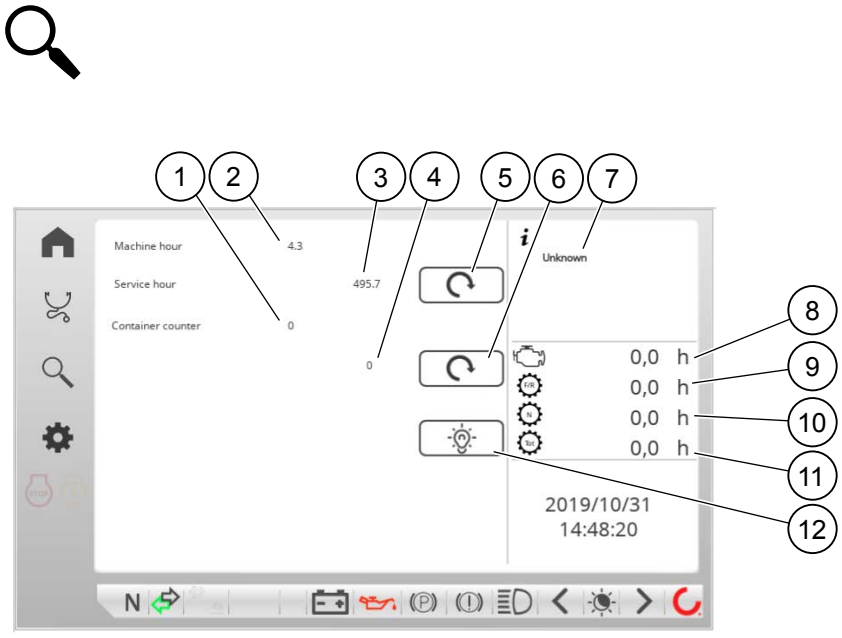
Machine overview > TPMS



1. Tire pressure unit
2. Pressure unit (bar, psi, kPa)

NOTE ***Adding, removing, and replacing sensors, as well as changing the pressure between bar, kPa, and psi, can only be done by service personnel.***

3.6.3.7 Information page



1. Container counter *)
2. Machine hours
3. Time to the next service
4. Container counter, can be reset *)
5. Resets service hour (3) (can only be done by service personnel)
6. Resets container counter (4)

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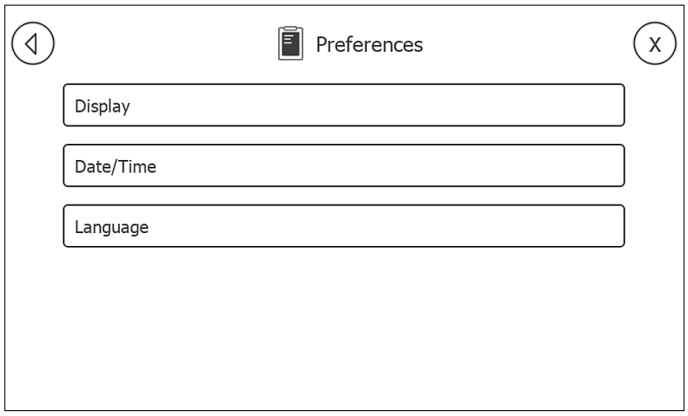
7. Machine information
8. Total engine hours
9. Driving hour counter
10. Neutral hour counter
11. Total hour counter
12. Lamp test button (button must be activated for daily maintenance)

*) Standard feature for attachments with twistlock, optional feature for attachments with clamps.

3.6.4 Preferences

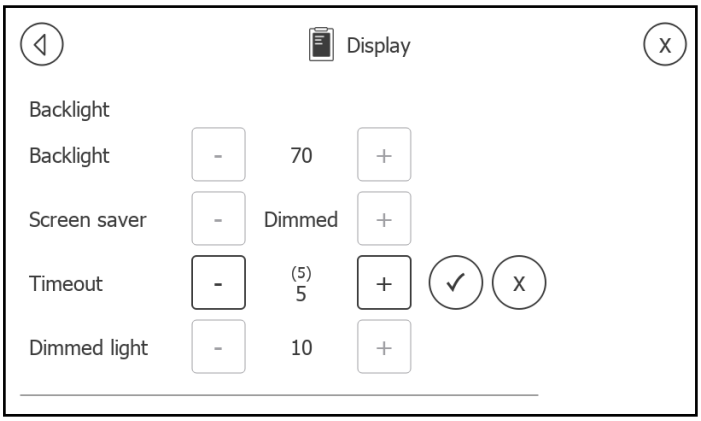
Settings > Preferences

Select the item to be changed from the **Preferences** menu:



- Display (backlight strength and screen saver on/off)
- Date and time
- Language

3.6.4.1 Setting the display backlight and screen saver



1. To set the backlight, set the value with [-] and [+].
2. To choose between screen saver **Off**, **Dimmed** and **Black**, press [-] and [+].
3. To set the timeout (when **Dimmed** or **Black**), set the value with [-] and [+].
4. To set the dimmed light (when **Dimmed**), set the value with [-] and [+].

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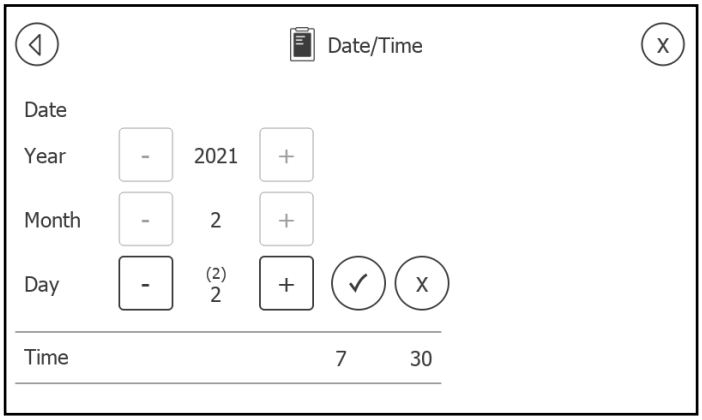
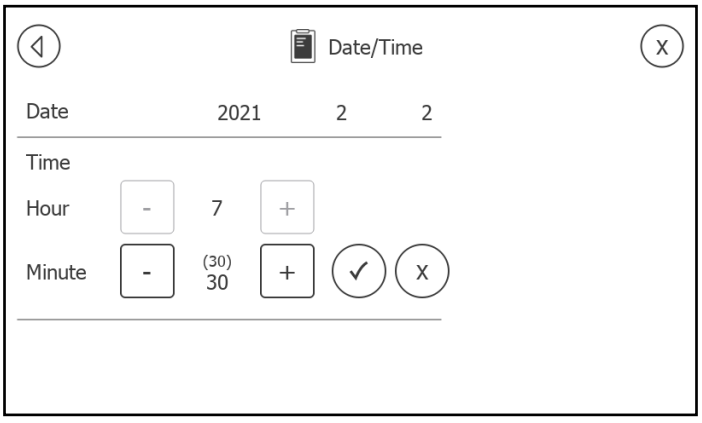
3.6.4.2 Setting the date



1. To set the year:
   1.1 Set the year with [-] and [+].
   1.2 Press ✓.
2. To set the month:
   2.1 Set the month with [-] and [+].
   2.2 Press ✓.
3. To set the day:
   3.1 Set the day with [-] and [+].
   3.2 Press ✓.

3.6.4.3 Setting the time



1. To set the time:
   1.1 Set the hours with [-] and [+].
   1.2 Press ✓.
   1.3 Set the minutes with [-] and [+].
   1.4 Press ✓.

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3.7 Lifting loads

3.7.1 Lifting capacity plate

⚠ WARNING

MACHINE MISUSE HAZARD

Incorrect lifting of a load may lead to serious personal injury and damage to the machine.

Check that the load is centered between the forks. Check that the forks are in good condition.

⚠ WARNING

MACHINE MISUSE HAZARD

Exceeding the maximum load affects the stability and safety margins of the machine.

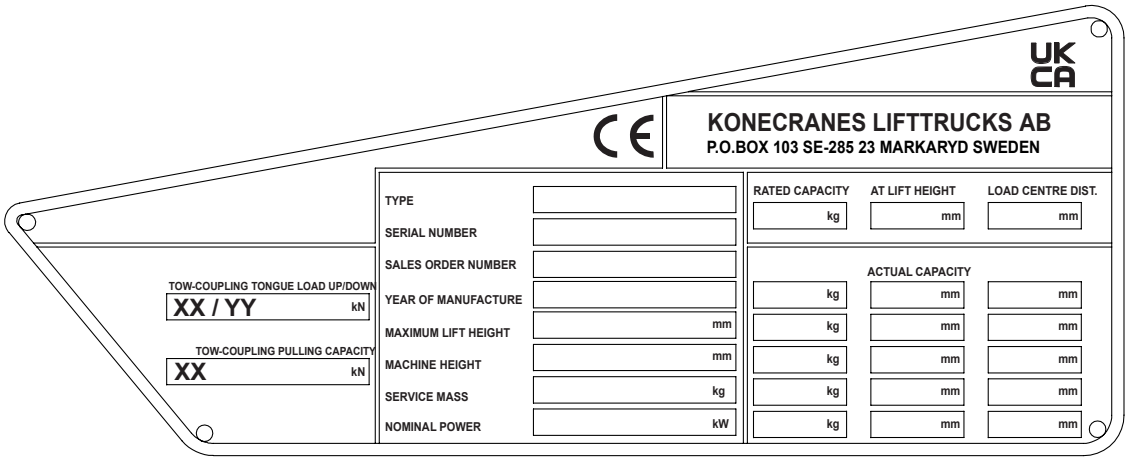
Do not use the machine to handle a greater load than what is stated on the lifting capacity plate.

⚠ WARNING

MACHINE MISUSE HAZARD

Konecranes is responsible for the safety of the machine. The warranty only applies as long as the machine is used within the areas of limitation. The areas of limitation are found on the the lifting capacity plate, EC assurance, and in the operating and maintenance instructions.

Lifting capacity plate



The lifting capacity plate is on the left side of the cabin. If an extra unit has been fitted, read the lifting capacity plate for the additional unit. The values that are indicated on the lifting capacity plate are valid for compact and regular loads. If the values are exceeded, there is a risk to the stability of the machine and the tensile strength of the machine, forks, and mast. The maximum capacity depends on the lifting height and the distance to the load center (LC). LC is the distance between the front face of the forks (with the mast vertical) and the center of gravity of the load.

The following is an example of values for the main lifting capacity and the alternative lifting capacities, which are indicated on the lifting capacity plate.

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Example of lifting capacity, model SMV 33-1200C

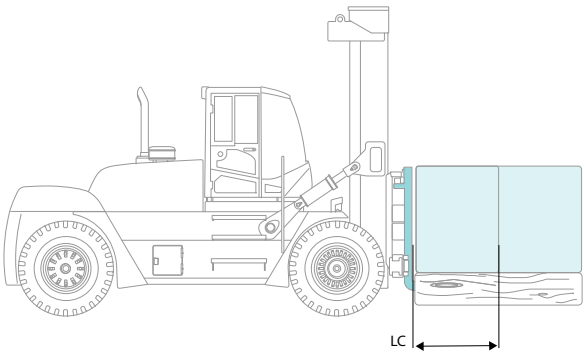
Lifting capacity is 33 tons (72,753 lbs) at lifting height 4,000 mm (157.5 in) and center of load 1,200 mm (47.2 in) (depending on the model).

Alternative lifting capacities, model SMV 33-1200C

The lifting capacity decreases as the center of load and the lifting height increase, according to the following examples:

Lifting capacity is 22 tons (48,502 lbs) at lifting height 4,500 mm (177.2 in) and center of load 1,500 mm (59 in) (depending on the truck model).

Lifting capacity is 19.5 tons (42,990 lbs) at lifting height 4,500 mm (177.2 in) and center of load 1,800 mm (70.9 in) (depending on the truck model).



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3.7.2 Maneuvering the mast with levers

⚠ DANGER

UNCONTROLLED MOVEMENT HAZARD

If the machine, or the equipment moves unexpectedly, it could result in personal injury, death, or damage to the equipment.

To stop any unexpected movement, press the emergency stop button.

⚠ WARNING

MACHINE MALFUNCTION HAZARD

Incorrect lifting of a load can lead to serious personal injury and damage to the machine. Handling of the machine outside of its area of use can lead to overloading and instability.

Use the mast and its additional equipment only for approved work. The operator must be trained in the handling of the machine and its equipment.

- Always maneuver the levers gently and slowly.
- The speed of the hydraulic functions depends on the lever position.
- The lever automatically returns to its neutral position when released.
- The levers for the hydraulic functions are on the console to the right of the operator's seat.

⚠ WARNING

MACHINE MISUSE HAZARD

Adding an attachment that is not suitable for the machine can cause the attachment to fall off. Risk of serious personal injury and damage to the machine.

Optional equipment that was not supplied with the machine may only be used if an authorized dealer has ensured that safe operations can be guaranteed in terms of lifting capacity and stability.

NOTE ***For more information, see Changes to the product (page 31).***

NOTE ***Pay attention to the operational symbols and the directional arrows.***

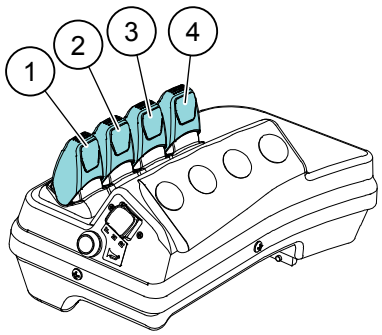

Figure 19. Lever functions

1. Fork carriage maneuvering
   - Pull lever backwards = raise the fork carriage.
   - Push lever forwards = lower the fork carriage.
2. Tilting of mast

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- Pull lever backwards = tilt the mast backwards.
- Push lever forwards = tilt the mast forwards.

3. Fork maneuvering (side shift) [1)]
   - Pull lever backwards = move the forks to the right
   - Push lever forwards = move the forks to the left
4. Fork distance maneuvering (spread) [1)]
   - Pull lever backwards = decrease the distance between the forks
   - Push lever forwards = increase the distance between the forks

[1)] Function can vary depending on options.

NOTE ***A fifth lever can be added for additional functions (optional).***

3.7.3 Maneuvering the mast with joystick (option)

DANGER

UNCONTROLLED MOVEMENT HAZARD

If the machine, or the equipment moves unexpectedly, it could result in personal injury, death, or damage to the equipment.

To stop any unexpected movement, press the emergency stop button.

WARNING

MACHINE MALFUNCTION HAZARD

Incorrect lifting of a load may lead to serious personal injury and damage to the machine. Handling of the machine outside of its area of use may lead to overloading and instability.

Use the mast and its additional equipment only for approved work. The operator must be trained in the handling of the machine and its equipment.

- Always maneuver the joystick gently and slowly.
- Hydraulic function speed depends on joystick movement.
- When released, the joystick automatically returns to its neutral position, and the movement stops.

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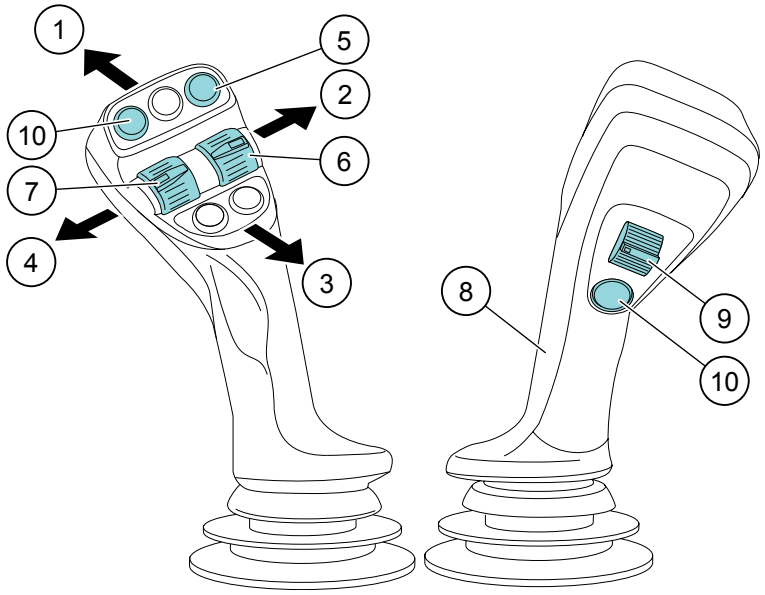

Figure 20. Maneuvering the mast and forks with joystick

1. Load down
2. Tilt mast forward
3. Load up
4. Tilt mast back
5. Horn, * one-stroke windshield wipers, roof, and front
6. Spreading forks
7. Side shifting forks
8. Capacitive/hand presence sensor
9. Gear switch
10. Alternative function trigger

* with (10) pressed

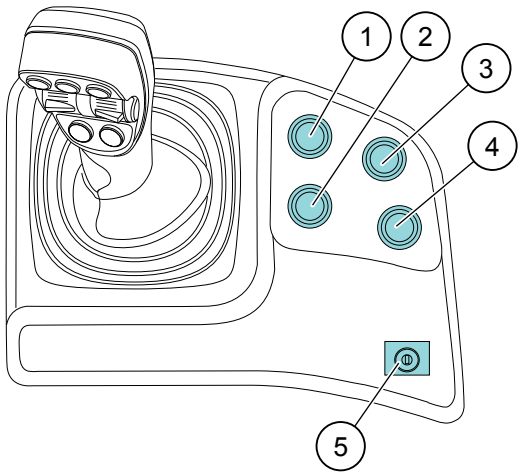

Figure 21. Joystick options

1. Optional function button
2. Optional function button
3. Optional function button
4. Activation button mini-wheel steering function (option)
5. Radio control key (option)

3.7.4 Mast and attachment symbols

The following table shows the meaning of symbols for the joystick and control stickers.

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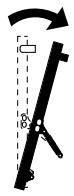
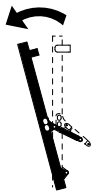
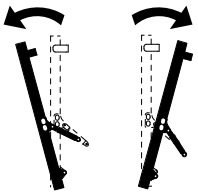


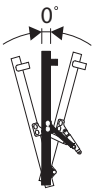
Tilt mast backward



Tilt mast forward



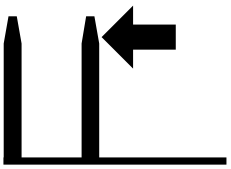
Mast tilt



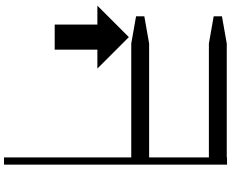
Mast autotilt (option)

Horn

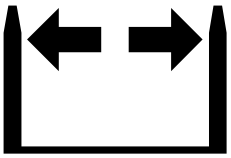
One-stroke windshield wipers, roof, and front



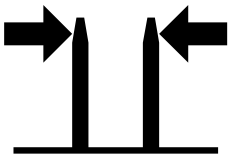
Sideshift forks left



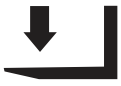
Sideshift forks right



Spread forks

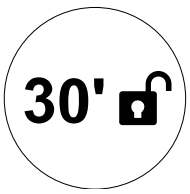


Bring forks together

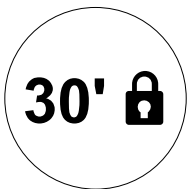


Forks down

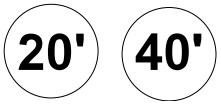
Forks up



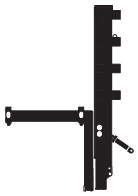
30' stop off



30' stop on



20' 40'



Mast with integrated attachment, top lift

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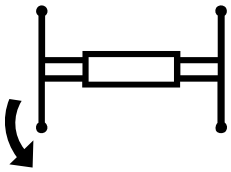
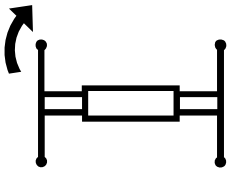
Skewing fork down

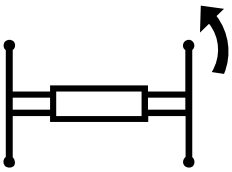
Skewing fork up



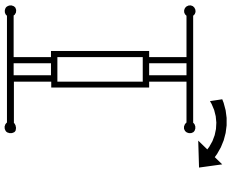
Top lift, slewing left rear



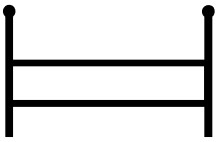
Top lift, slewing left front



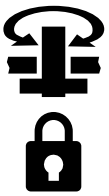
Top lift, slewing right front



Top lift, slewing right rear

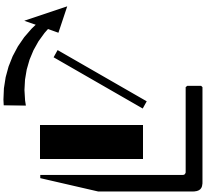


Forklift side lift 1

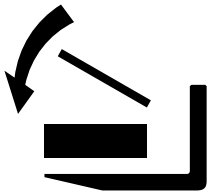


Twistlock locked

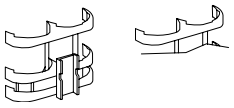
Twistlock open



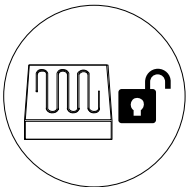
Load stabilizer tilts up



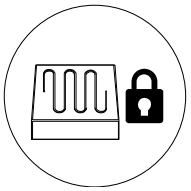
Load stabilizer tilts down



Paper clamp



Lifting magnet disengaged



Lifting magnet engaged

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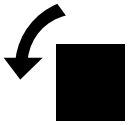
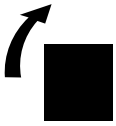


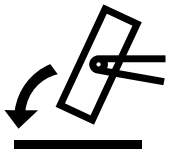
Rotate counterclockwise



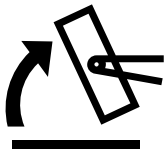
Rotate clockwise

Tighten clamp

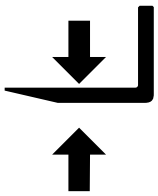
Release clamp



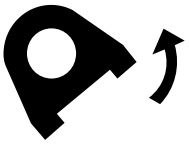
Upender-rotate forward



Upender-rotate backward

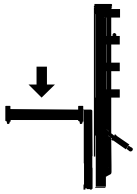


Fork leveling

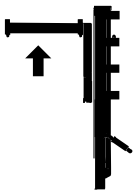


Forks rotate counterclockwise

Forks rotate clockwise



Top lift, lower



Top lift, raise

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4 OPERATING INSTRUCTIONS

⚠ WARNING

RISK OF DAMAGE AND PERSONAL INJURY

Loose objects or liquids in the cabin can cause unintended incidents. There is a risk of tripping, visibility reduction, fire, and other hazards due to unpredictable interference with the machine commands.

In case of a machine tip-over, loose objects can also cause damage and personal injury.

Always keep the cabin tidy and clear of debris and loose objects or liquids.

Never add any fixtures other than the ones provided from the manufacturer.

4.1 Daily maintenance before operation

⚠ DANGER

UNCONTROLLED MOVEMENT HAZARD

If the machine moves unexpectedly, it could result in personal injury, death, or damage to the equipment.

To stop any unexpected movement, press the emergency stop button.

⚠ WARNING

MOVING PARTS HAZARD

There is a risk of getting trapped by moving parts of the engine. There is also a cutting risk from moving parts of the engine.

Do not open the hood or perform maintenance work while the engine runs.

⚠ WARNING

TOXIC SUBSTANCE HAZARD

Breathing diesel engine exhaust exposes you to chemicals that may cause cancer, birth defects, or other reproductive harm.

Never run the engine in unventilated places. Use fume extraction.

Do not keep the engine idling, except when necessary.

Do not modify or tamper with the exhaust system.

⚠ WARNING

IGNITION HAZARD

During operation, parts of the machine can become very hot. If there are flammable or combustible materials, on or near any hot surfaces on the machine, there is a risk of fire. Examples of such materials are paper, or saw dust.

Before taking the machine into operation, make sure that there are no flammable or combustible materials on or around any hot surfaces. Examples of hot surfaces can be the turbo, exhaust pipe, DPF, and so on.

NOTE ***Visually inspect the machine for damage while going through the checklist during daily maintenance.***

NOTE ***Check the condition of the safety and information labels, replace if needed.***

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NOTE ***After performing the daily maintenance tasks, start the machine and listen for any abnormal noise from the engine and transmission. If any abnormal noise is heard, contact maintenance personnel.***

1. Check the battery main switch
2. Check the wheel nuts and clamps.
3. Check the tire pressure and the condition of tires and rims (visible cracks and damages).
4. Check the engine oil level.
5. Check the transmission oil level.
6. Check the coolant level in all tanks.
7. Check the hydraulic oil level.
8. Check the brake cooling oil level (option, not available for all models).
9. Check the grease level in the two reservoirs for the automatic lubrication system (option).

NOTE ***If automatic lubrication is installed (optional), there can be one or two tanks.***

10. Check the MD4 warnings for clogging of engine air filter.
11. Check the windshield washer fluid level.
12. Check the fuel level.
13. Check the AdBlue level (when applicable).
14. Check the soot level (when applicable).
15. Check that the mirrors are clean and adjust them to make sure of good visibility.
16. Check that the windows are clean.
17. Clean the rearview camera (option).
18. Check for visual signs of leakage, around and under the machine
19. Check the seat adjustments and adjust if needed.
20. Check the steering wheel adjustments.
21. Check the service brake functionality.
22. Check the parking brake functionality.
23. Check the functionality of the steering system.
24. Check the hydraulic functions.
25. Check the electrical functions.
26. Check the climate unit (option) settings.

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4.2 Daily maintenance checks

4.2.1 Turning on and turning off the battery main switch

⚠ DANGER

EXPLOSION HAZARD

Short-circuiting the battery may cause a fire or explosion, which can cause a risk of serious injury or death.

To reduce the risks of electric shock and personal injury always remove jewelry and conductive material before working on the electrical system.

⚠ DANGER

EXPLOSION HAZARD

Batteries generate explosive hydrogen when charged, which can cause a risk of serious injury or death.

Always use the necessary protective equipment. Ensure that there is good ventilation and avoid sparking.

⚠ DANGER

ELECTRIC SHOCK HAZARD

Even when the battery main switch is turned off, there may still be voltage present in some parts of the machine. The main disconnect does not cut the power to the alternator. This causes a risk of electric shocks, which can lead to death or serious personal injury.

To reduce the risks of electric shock and personal injury always remove jewelry and conductive material before working on the electrical system.

Always disconnect the ground (minus) cable at the battery when working near or on the alternator.

Be aware of the battery main switch functionality.

⚠ WARNING

TIPPING OVER HAZARD

If the battery main switch is turned off when the machine moves, the parking brake is activated. The machine may tip over, causing a risk of serious personal injury and damage to the machine.

Unless there is an emergency situation, do not turn off the battery main switch when the engine runs.

NOTE ***Do not operate the machine unless you know the location of the battery main switch (1).***

NOTE ***If the machine has an engine that uses AdBlue solution, wait after turning off the combustion engine. After the AdBlue pump has finished pumping all the fluid from the hoses to the AdBlue tank, turn off the battery main switch (1). The required time varies slightly between different engine models.***

NOTE ***Remove the main switch handle when parking the machine.***

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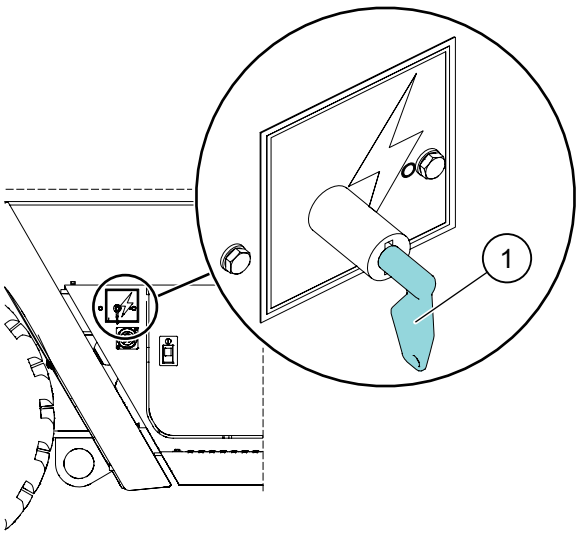

Figure 22. Battery main switch

1. Before operating, turn on the battery main switch (1).
   Turn the battery main switch (1) clockwise.
2. After operating, turn off the battery main switch (1).
   Turn the battery main switch (1) counterclockwise.

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4.2.2 Checking the condition and pressure of the tires

DANGER

HIGH-PRESSURE HAZARD

Release of high-pressured air could cause death or serious personal injury.

Proceed with caution when working with pressured air systems. Use approved personal protective equipment. Follow all safety requirements. Only trained personnel are allowed to check tire pressure and inflate tires.

DANGER

HIGH-PRESSURE HAZARD

The tires may explode when inflated or deflated. Standing inside the tire explosion danger zone during a tire explosion causes death.

Always stand beside the wheel when deflating or inflating tires, see tire explosion danger zone illustration. Use safety glasses.

NOTE ***If the machine is equipped with tire pressure monitoring system (TPMS), the tire pressure can be checked on the display.***

NOTE ***Driving with incorrect tire pressure makes the machine unstable, and increases the fuel consumption. It can also cause unnecessary wear and tear of the tire, which can result in a flat tire or a tire explosion.***

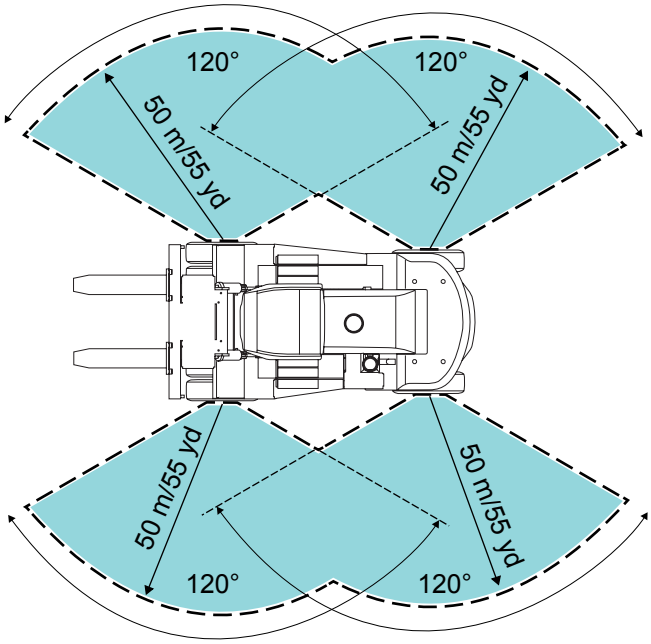

Figure 23. Forklift tire - explosion danger zones

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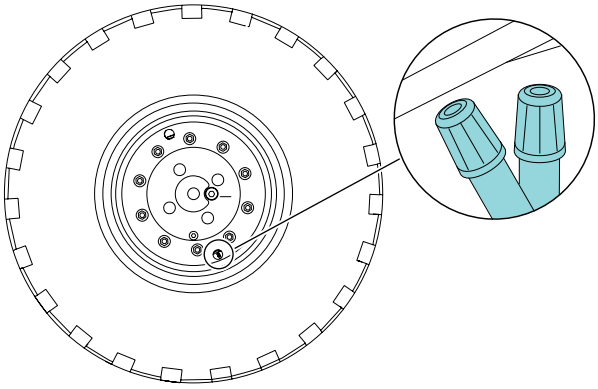

Figure 24. Drive axle tires

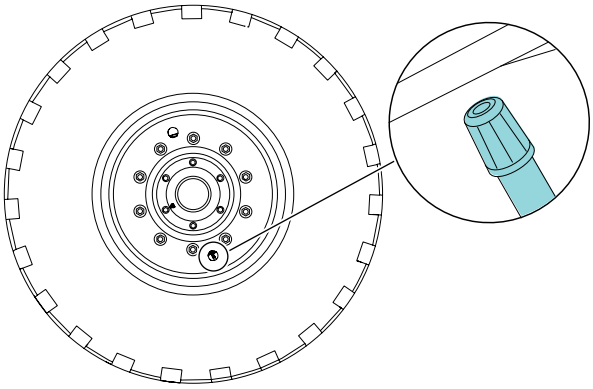

Figure 25. Steer axle tires

1. Check that the tires have not become too worn and are undamaged.
2. Remove any deposits (debris and dirt) from the tread.
3. Remove any deposits (debris or objects) stuck between the tires.

⚠ DANGER

HIGH-PRESSURE HAZARD

The tires may explode if you try to remove objects that are stuck in them, which could cause death or serious personal injury.

To remove any objects that are stuck in the tire, contact authorized personnel.

4. Check that no wheel nuts are missing or loose.
5. Check that the tires have the correct pressure according to the recommendations of the manufacturer.
6. Inflate or deflate the tires according to the relevant recommendations.
   Always take the ambient temperature into account.

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4.2.3 Checking the engine oil level

⚠ WARNING	
	IRRITATING SUBSTANCE HAZARD **The machine contains several chemical substances which may cause skin irritations and allergies. Personal injury hazard if long-term skin contact.** **Avoid direct contact with skin when handling chemical substances. Use safety gloves. Immediately wash skin that comes in contact with chemical substances. Use safety goggles.**

NOTE ***Make sure that the engine is switched off before checking the engine oil level.***

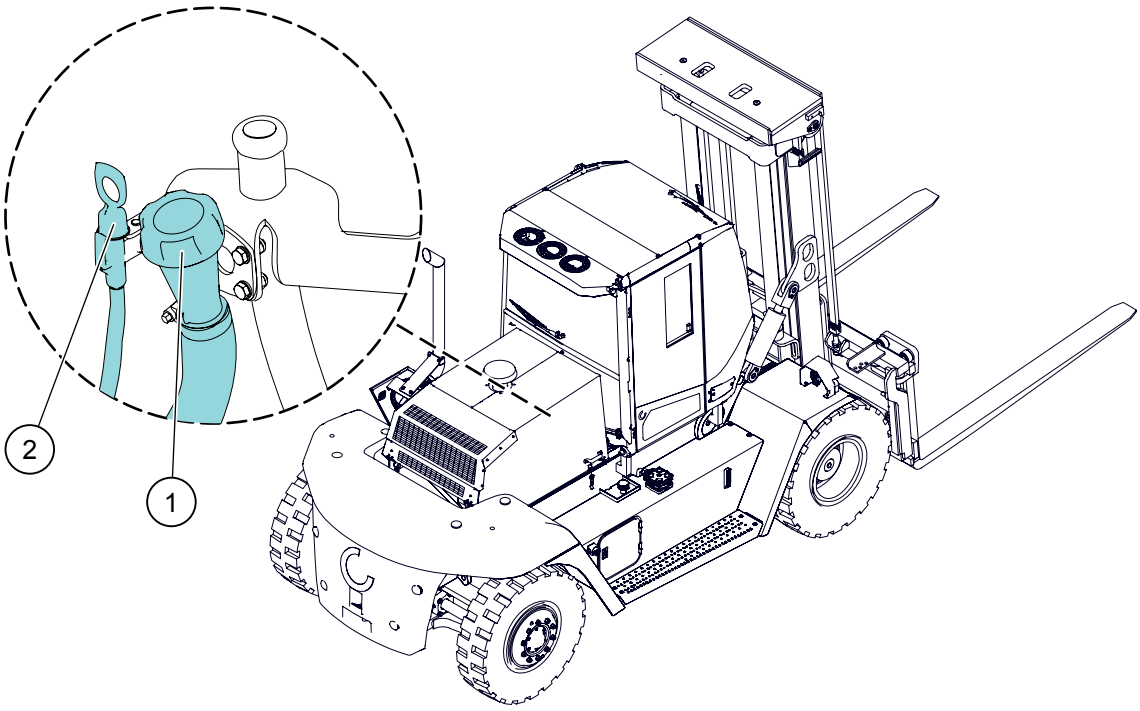

Figure 26. Checking the engine oil level, Volvo engines

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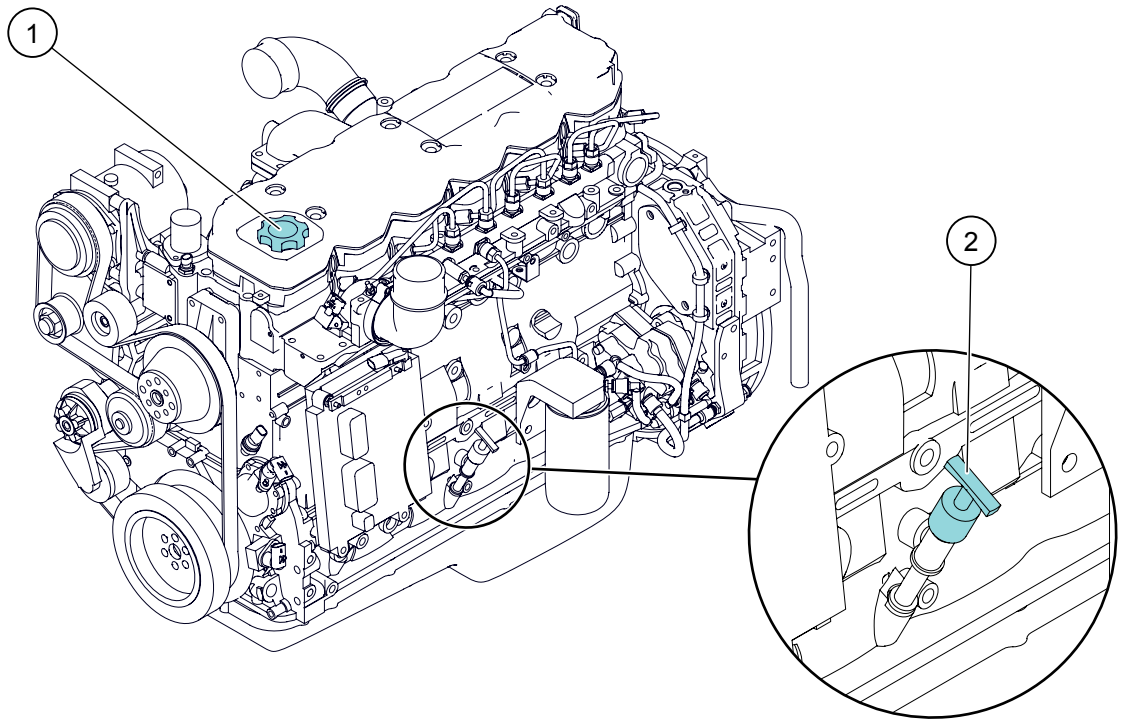

Figure 27. Checking the engine oil level, Cummins engines

1. To access the dipsticks and oil filling, open the engine hood.
2. Remove the dipstick (2) and dry it off with a clean cloth.
3. Put back the dipstick fully and remove again.
   The oil level must be between the minimum and maximum level indicators (in the operating temperature, at least 65°C or 149°F).
4. If necessary, remove the filler cap (1) and top up the oil.

NOTE ***Only trained service personnel are allowed to fill oil.***

5. Fill with the recommended oil. See Recommended fluids and lubricants (page 172).
   Make sure that the oil level is between the minimum and maximum marks on the dipstick. Do not fill above the maximum oil level.

   See maintenance data for the volume.

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4.2.4 Checking the DANA transmission oil level

⚠ WARNING	
	HOT FLUID HAZARD **Risk of serious personal injury.** **Avoid spilling hot oil and do not touch hot surfaces.**

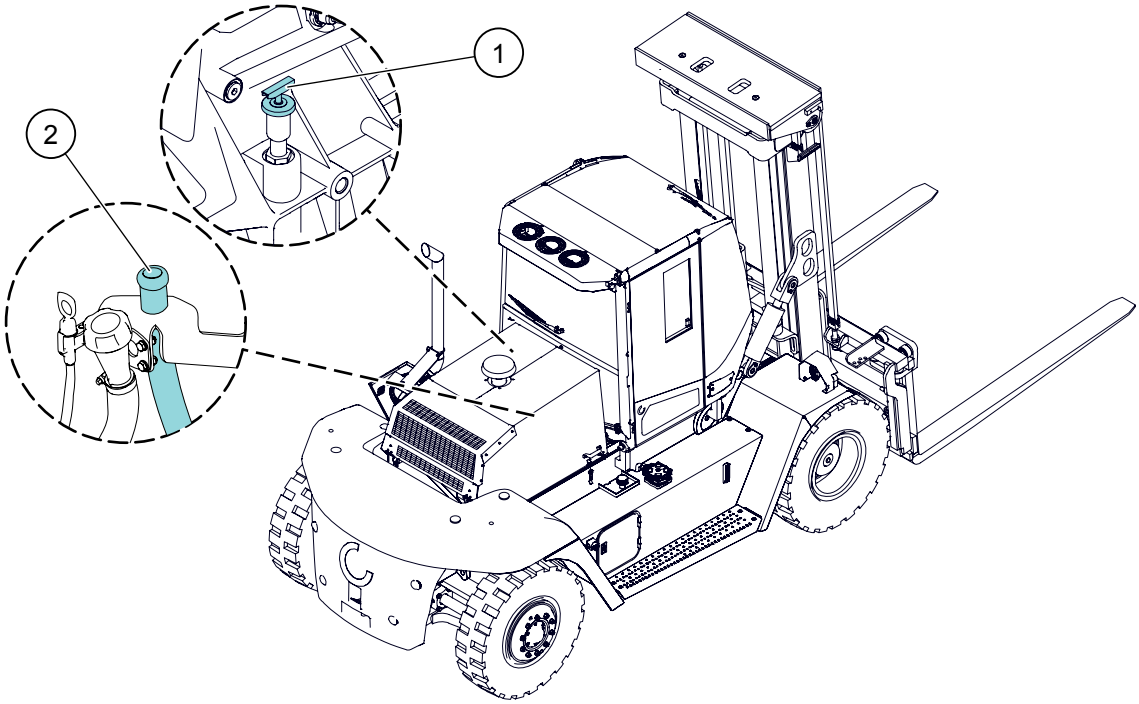

Figure 28. Checking transmission oil level

NOTE ***Park the machine on level ground in a safe working area.***

1. Start the engine.
2. Run the engine until it has reached operating temperature 82–93° C (180–200° F).

NOTE ***Oil temperature must be at least 65° C (149° F).***

3. Open the hatch for the dipstick (1) and the oil filling (2).
4. Remove the dipstick (1) and dry it off with a clean and lint free cloth.
5. With the engine idling, insert the dipstick (1) fully.
6. Remove the dipstick (1) again.
7. Check that the oil level is between the minimum and maximum level indicators.
8. If the level is incorrect, contact your local service team.

NOTE ***Only trained service personnel are allowed to top up transmission oil.***

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4.2.5 Checking the ZF transmission oil level

⚠ WARNING

HOT FLUID HAZARD
Risk of serious personal injury.
Avoid spilling hot oil and do not touch hot surfaces.

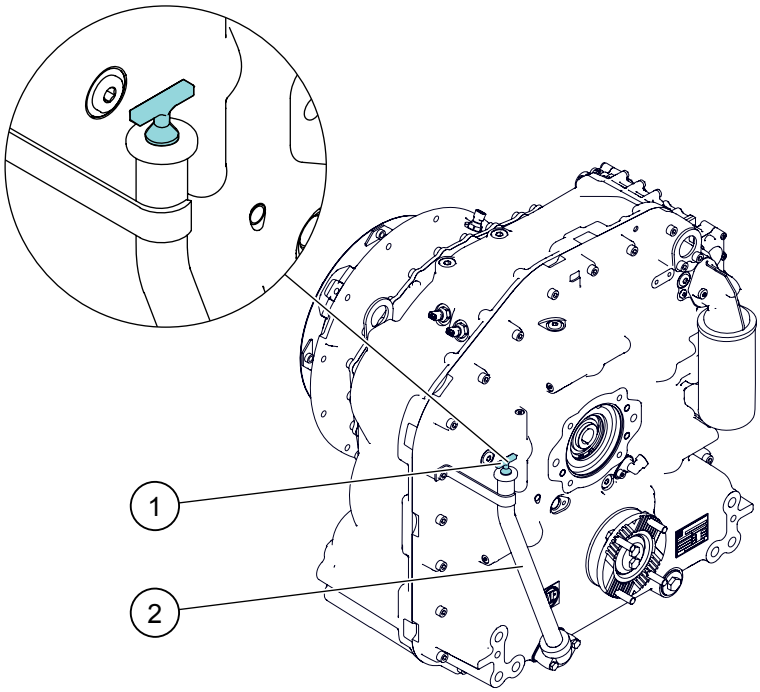

Figure 29. Checking the ZF transmission oil level

NOTE ***Park the machine on level ground in a safe working area.***

1. Start the engine and run until the oil has reached operating temperature (at least 65°C or 149°F).
2. Remove the dipstick (1) and dry it off with a clean and lint free cloth.
3. With the engine idling, put back the dipstick fully into the tube (2) and remove it again. The oil level must be between the minimum and maximum level indicators.
4. If level is low, contact your local service team.

NOTE ***Only trained service personnel are allowed to top up transmission oil.***

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4.2.6 Checking the coolant level, Volvo engines

⚠ WARNING

TOXIC SUBSTANCE HAZARD

It is highly dangerous to drink ethylene glycol. Contact with skin or spray from the refill can cause skin irritation and eye damage.

Do not drink ethylene glycol, and avoid contact with skin.

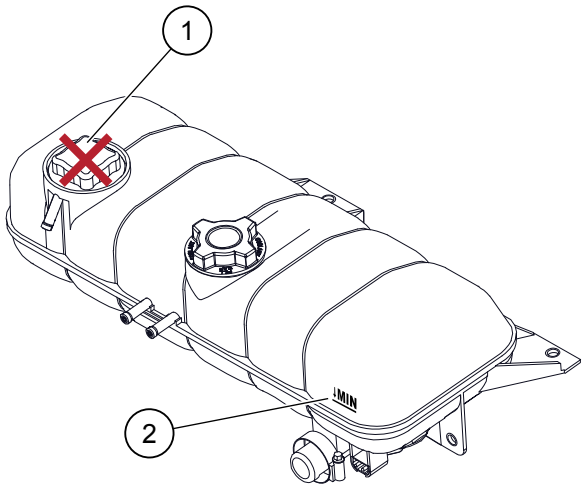
⚠ WARNING

HOT COOLANT HAZARD

Opening the pressure chamber cap can cause serious personal injury.

Never open the pressure chamber cap (1) when checking, or refilling coolant.

NOTE ***Only authorized maintenance personnel are allowed to fill the coolant.***



1. Check the level of the coolant on the level indicator (2).
   The level should always be above the minimum level.

NOTE ***If the coolant level decreases much every day, notify the maintenance personnel.***

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4.2.7 Checking the coolant level, Cummins

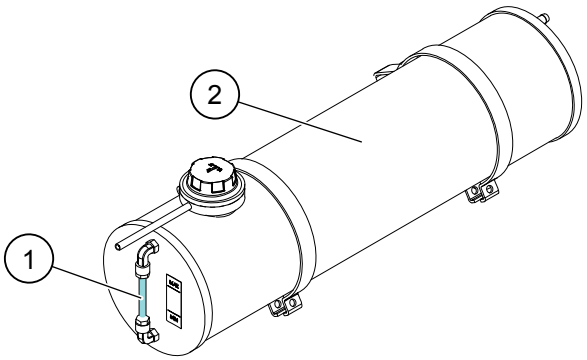
⚠ WARNING

TOXIC SUBSTANCE HAZARD

It is highly dangerous to drink ethylene glycol. Contact with skin or spray from the refill can cause skin irritation and eye damage.

Do not drink ethylene glycol, and avoid contact with skin.

NOTE ***Only authorized maintenance personnel are allowed to fill the coolant.***



1. Check the level of the coolant.
   The level should be at maximum on the level indicator (1) of the coolant tank (2).

NOTE ***If the coolant level decreases much every day, notify the maintenance personnel.***

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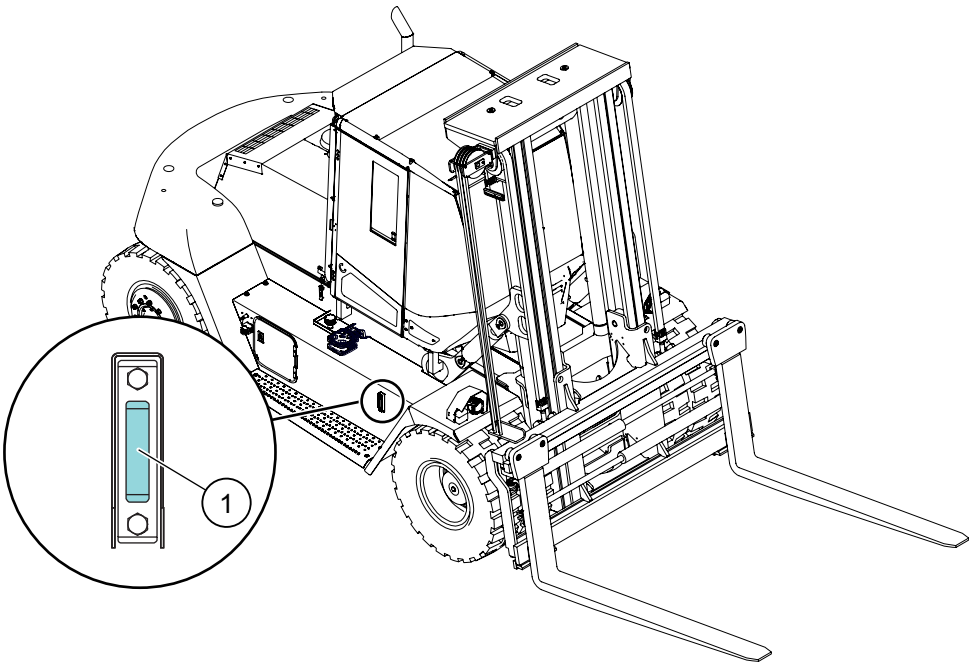
4.2.8 Checking the hydraulic oil level

⚠ WARNING	
	HOT FLUID HAZARD **Hot hydraulic oil may spray from the oil refill, which may cause a risk of serious personal injury.** **Do not fill hydraulic oil while the machine runs.**



Before checking the hydraulic oil level, make sure that the mast and forks are lowered.

The mast should also be tilted to the maximum rear position.

1. Check that the oil level is between the minimum and maximum level marks on the indicator (1) at the side of the hydraulic oil tank.

NOTE ***When the oil is warm, the oil level raises.***

NOTE ***Only trained service personnel are allowed to fill the oil.***

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4.2.9 Checking the brake cooling oil level (option)

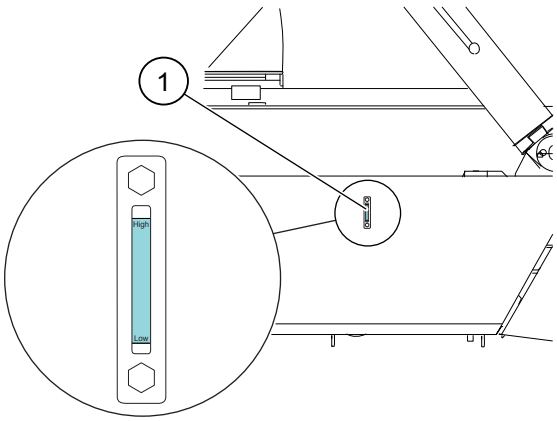
⚠ WARNING

HOT FLUID HAZARD

Hot oil may spray from the oil refill, which may cause a risk of serious personal injury.

Do not fill oil while the engine is running.

NOTE ***Park machine on level ground in a safe working area.***



1. Check that the brake cooling oil level is between the minimum and maximum level marks of the indicator at the side of the brake cooling oil tank (1).
2. If level is low, contact your local service team.

NOTE ***Only trained service personnel is allowed to top up the brake-cooling oil.***

4.2.10 Checking the engine air filter, Volvo engines

NOTE ***In sandy or dusty environments with a large number of particles, clean the engine air filter more frequently. Only authorized maintenance personnel are allowed to clean the air filter.***

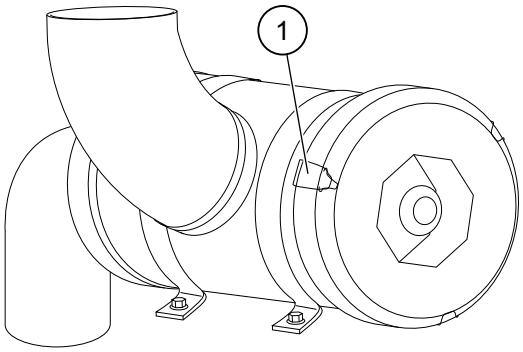


Figure 30. Checking the engine air filter

1. When the engine air filter (1) needs to be checked, a warning about air inlet pressure appears on the MD4 display.

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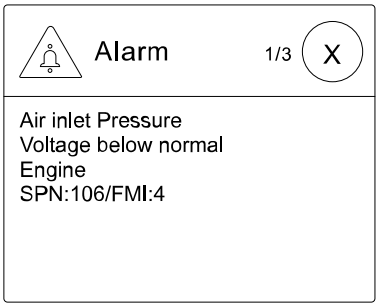

2. If warning appears in the MD4 display, contact your local service team.

4.2.11 Checking the windshield washer level

NOTE ***Park machine on level ground in a safe working area.***

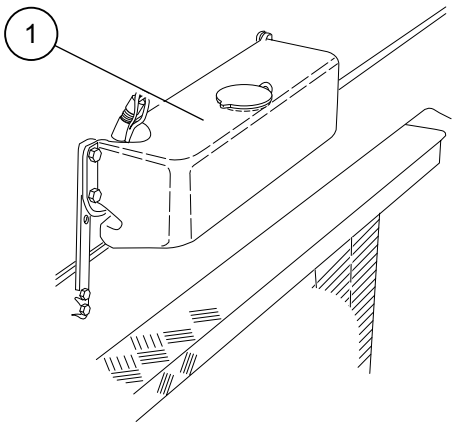

Figure 31. Windshield washer fluid tank

1. Check the windshield washer fluid level in the washer fluid tank (1).

NOTE ***To see the level, open the lid.***

2. If level is low, contact your local service team.

NOTE ***Only trained service personnel are allowed to top up the windshield washer fluid.***

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4.2.12 Checking the fuel level

DANGER	
	IGNITION HAZARD **Spilling fuel may start a fire, which can cause serious injury or death and can damage the machine.** **Spilling fuel can also damage the environment.** **Do not spill fuel.**

NOTE ***If air enters the fuel system, the engine stops. To avoid air being sucked into the fuel system, never run the machine until the fuel tank is empty. If air enters the fuel system, a service technician must bleed the fuel system.***

NOTE ***Turn off the engine before filling fuel.***

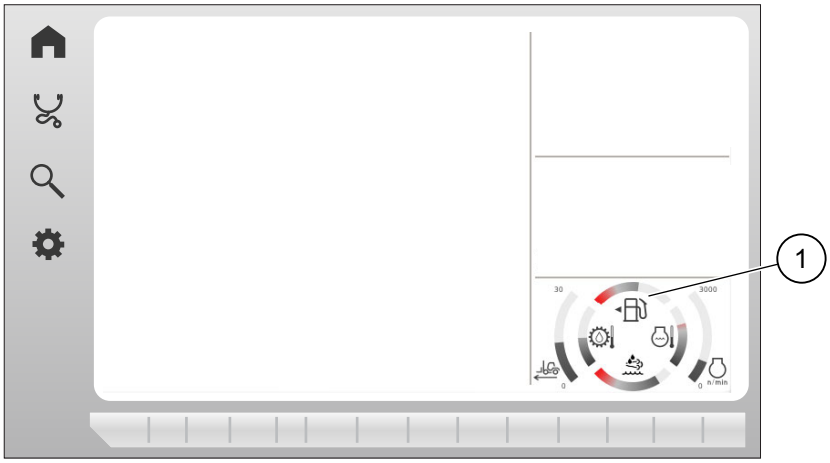

Figure 32. Checking the fuel level

1. Check the fuel level (1) in the MD4 display.
2. If the level is too low, fill up the fuel.

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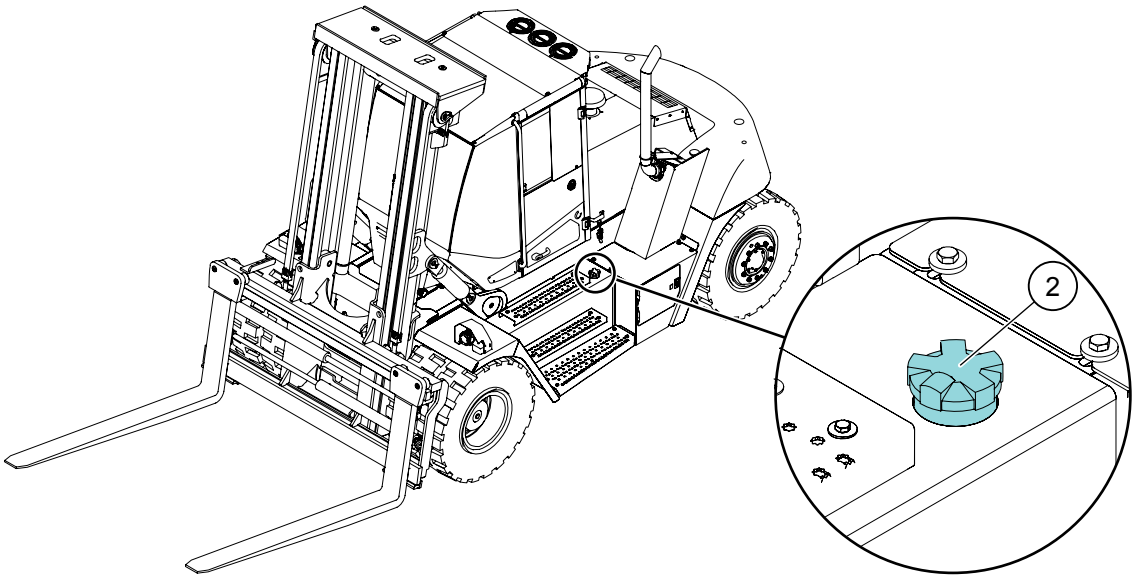

Figure 33. Adding fuel

1. Clean the area around the filler cap (2).
2. Open the filler cap (2) on the fuel tank.
3. Fill with the recommended fuel. See Recommended fluids and lubricants (page 172). See maintenance data for volume.
4. Refit the filler cap (2), and tighten it.

4.2.13 Checking the AdBlue level

⚠ WARNING

HARMFUL SUBSTANCE HAZARD

Causes irritation on skin or eye contact.

Handle carefully, avoiding contact with skin and eyes. If you get AdBlue solution on your skin or eyes, quickly wash it off with soap and water.

⚠ WARNING

CORROSIVE SUBSTANCE HAZARD

The AdBlue solution is corrosive towards certain metals such as copper and aluminum, which is used in harnesses, cables and connectors.

Do not allow the AdBlue solution to come into contact with any parts that are made of copper or aluminum. Corrosion starts and progresses rapidly.

NOTE ***AdBlue information for Volvo stage V engines is found here, Selective catalyst reduction (SCR) - Volvo stage V (page 111), and for Cummins stage IV engines here, Selective catalyst reduction (SCR) - Cummins engines (page 116).***

NOTE ***AdBlue level must be more than 10%. If the AdBlue level becomes less than 8%, the engine generates an error code which must be restored by Volvo.***

NOTE ***If the AdBlue level is less than 23%, the torque of the engine starts to derate, which reduces the capacity of the machine.***

NOTE ***In temperatures below -11°C (12°F), the AdBlue solution freezes. Do not store below -11°C (12°F), recommended storing temperature is approximately 20°C (room temperature).***

1. Start the engine.

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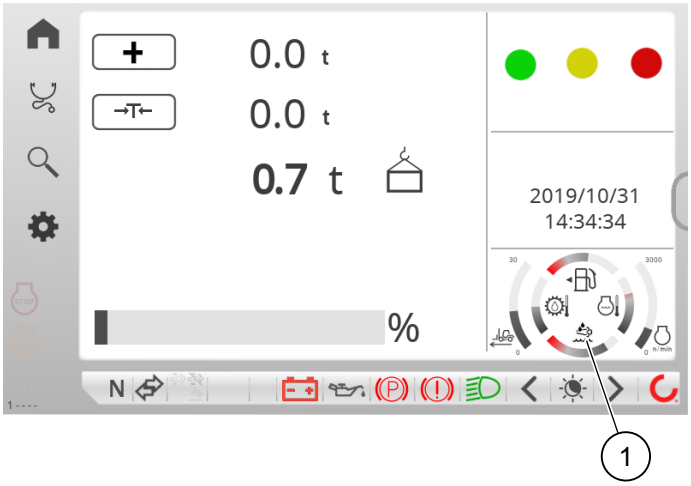
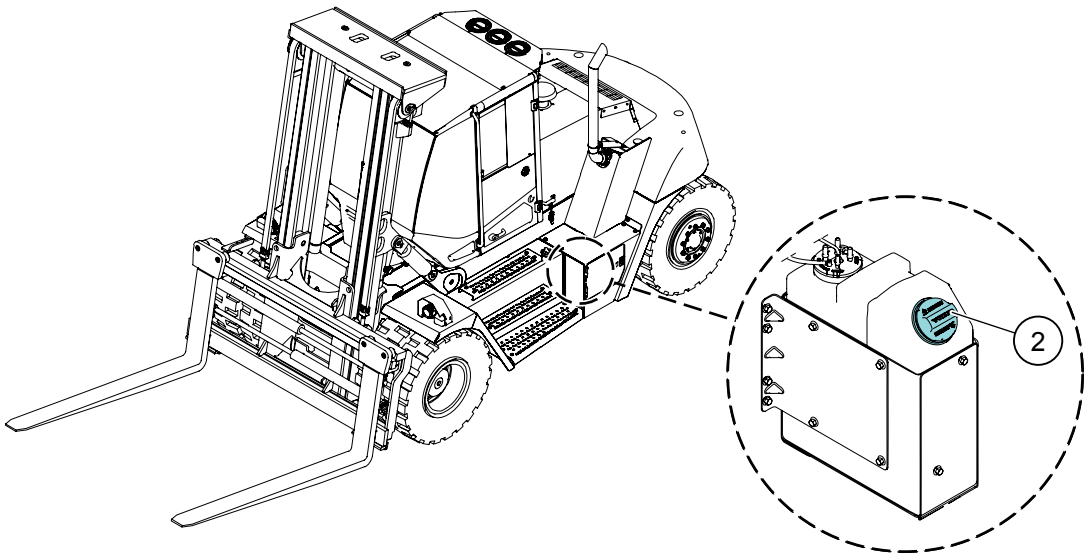
2. All **Main pages** show the AdBlue level (1) as percentage of the total tank volume.



3. If the level is too low, open the hatch to access the AdBlue tank.

NOTE ***When the level is too low, the symbol for AdBlue level (1) becomes red.***



4. Clean the area around the AdBlue tank cap (2).
5. Open the AdBlue tank cap (2) and fill with the recommended AdBlue solution. See maintenance data for maximum volume.
6. Refit the AdBlue tank cap.
7. Close the hatch for AdBlue.

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4.2.14 Check the soot level

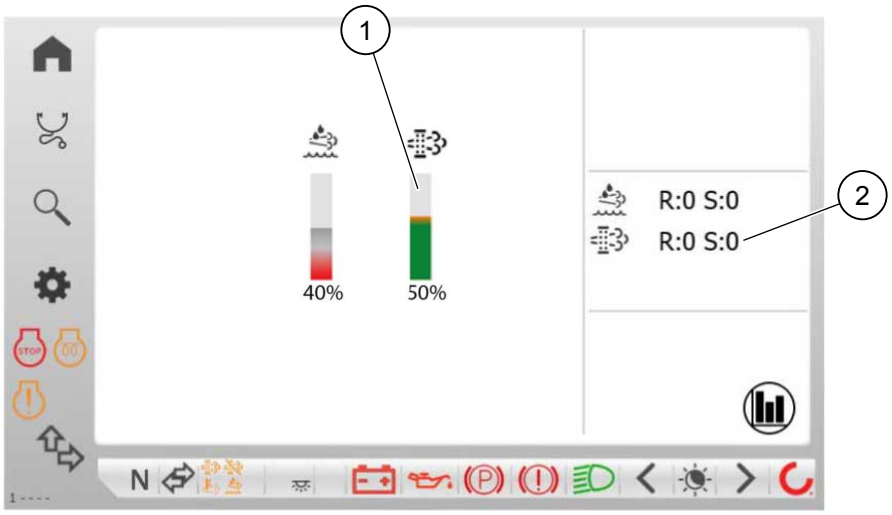

Figure 34. Emission page

1. Check the soot level (1) in the MD4 display.
2. Check the reason and severity of the soot level (2).
3. Perform a parked regeneration when needed.

NOTE ***For Volvo engines, see Parked regeneration - Volvo stage V (page 113).***

4.2.15 Adjusting the operator's seat

DANGER

UNCONTROLLED MOVEMENT HAZARD

During an accident, not wearing the seat belt could result in serious personal injury or death.

Always fasten the seat belt before driving.

For optimum safety, and ergonomics, always adjust the seat to the individual preferences before starting the machine. Check and replace or repair if you notice any of the following:

- cut or frayed straps
- worn or damaged hardware, including anchor points
- buckle or retractor malfunction
- loose stitching

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4.2.15.1 Adjusting the BE-GE operator's seat

Be-Ge 91-series

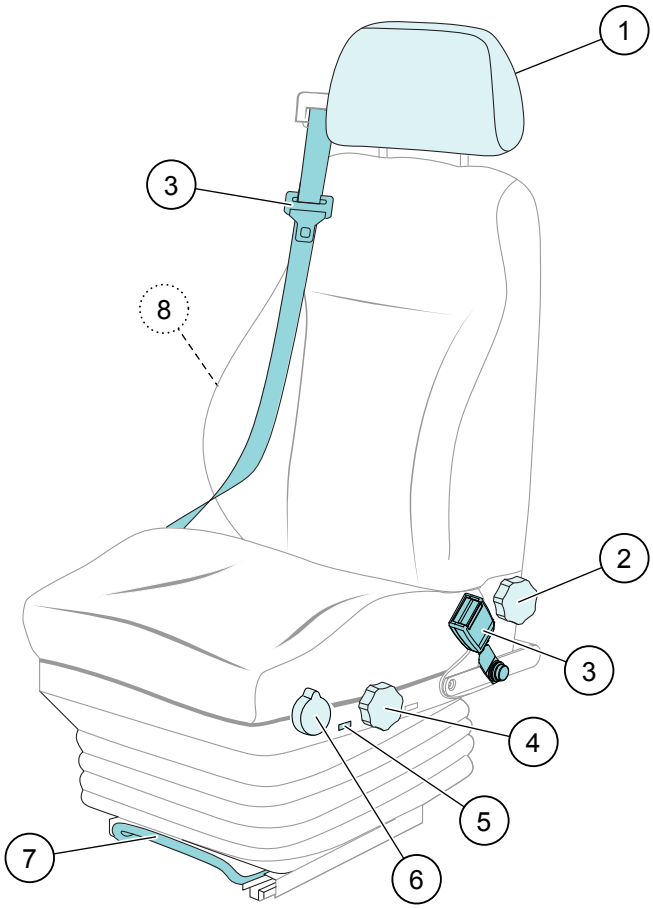

Figure 35. Controls for the BE-GE operator's seat

1. Headrest (option)
2. Backrest adjustment
3. Integrated 3-point seat belt (option)
4. Seat cushion angle adjustment
5. Height and weight adjustment
6. Quick-release
7. Length adjustment 160 mm (6.30 in)
8. Lumbar adjustment

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Be-Ge 92-series

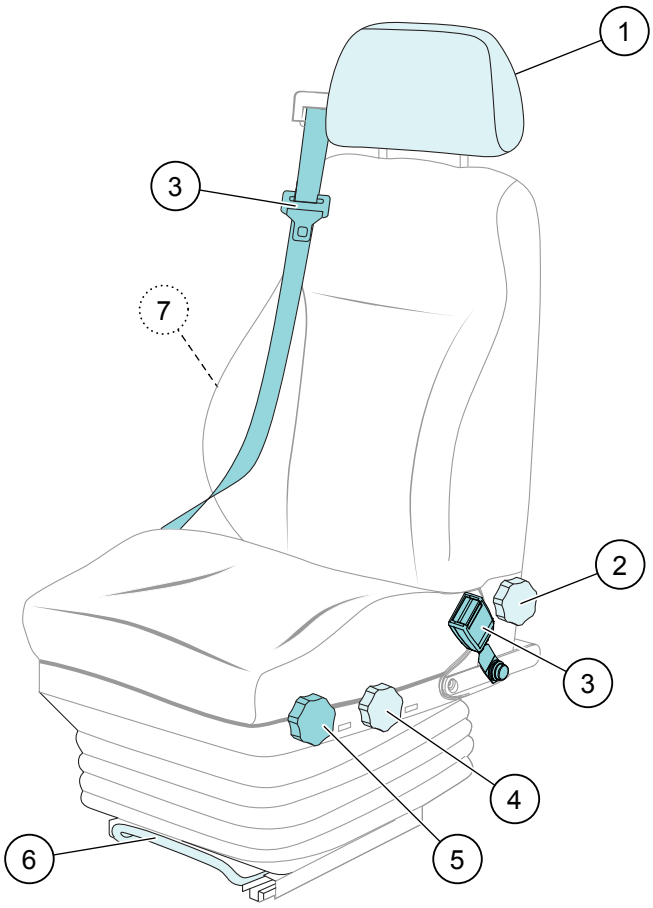

Figure 36. Controls for the BE-GE operator's seat

1. Headrest (option)
2. Backrest adjustment
3. Integrated 3-point seat belt (option)
4. Seat cushion angle adjustment
5. Height and weight adjustment
6. Length adjustment 160 mm (6.30 in)
7. Lumbar adjustment

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Be-Ge 31-series

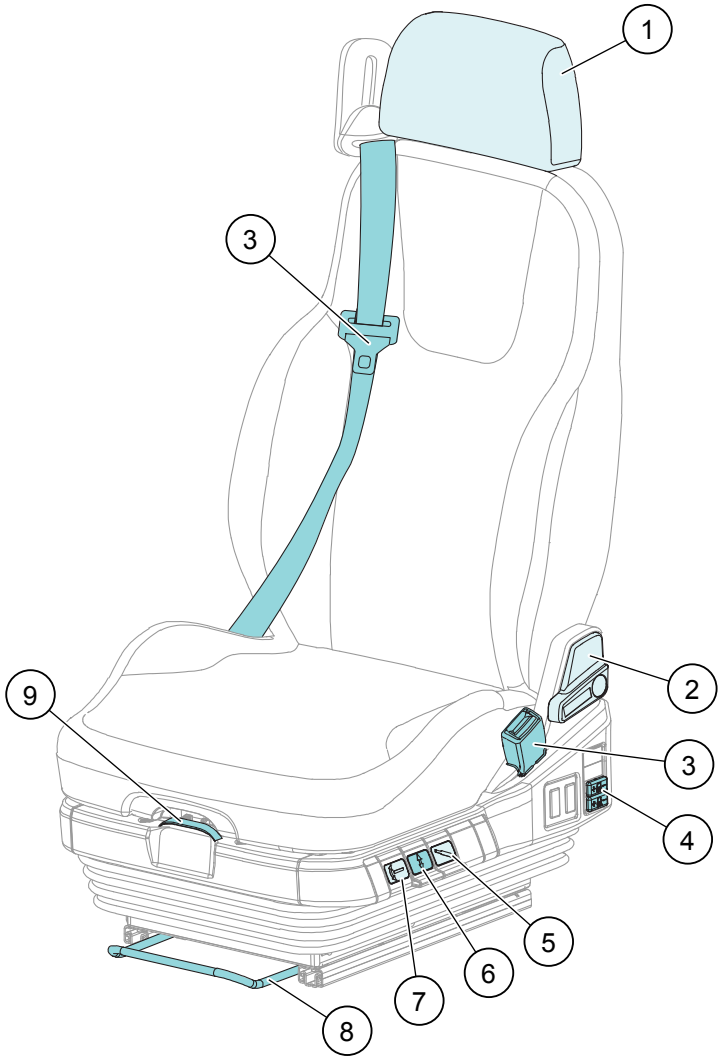

Figure 37. Controls for the BE-GE operator's seat

1. Headrest (option)
2. Quick-release backrest adjustment
3. Integrated 3-point seat belt (option)
4. Air controlled backrest functions [1)]
5. Shock absorber
6. Height adjustment
7. Seat cushion angle adjustment
8. Length adjustment 210 mm (8.27 in)
9. Seat cushion length adjustment

[1)]Heating and airvent (option)

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4.2.15.2 Adjusting the Isringhausen operator's seat

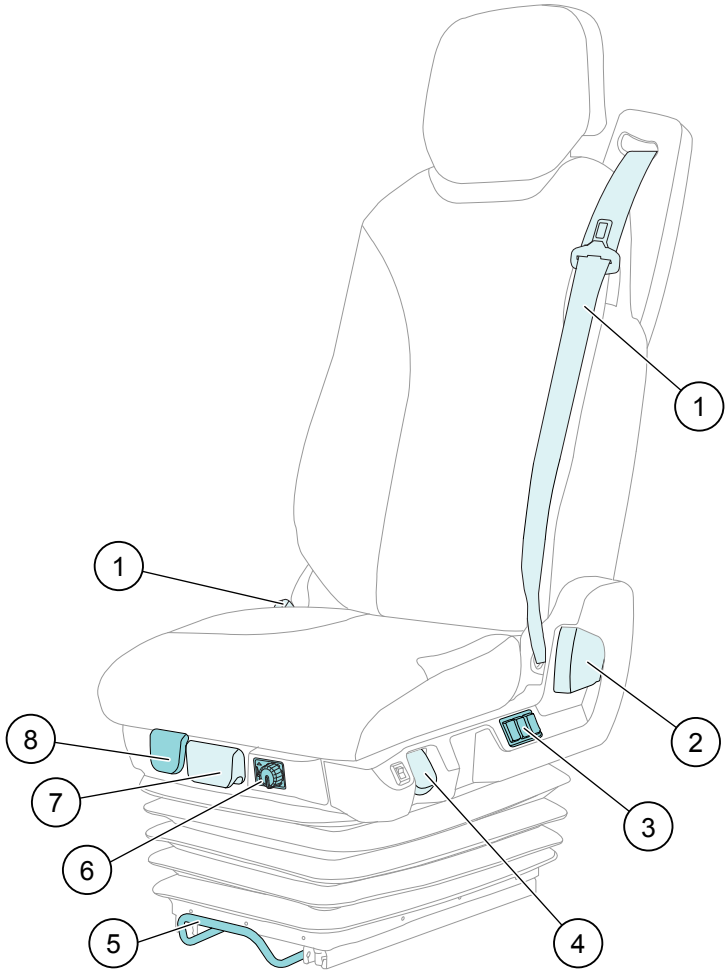

Figure 38. Controls for the Isringhausen operator's seat

1. Integrated 3-point seat belt
2. Backrest adjustment
3. Integrated pneumatic system (IPS)
4. Adjustable vertical shock absorber
5. Horizontal adjustment
6. Weight and height adjustment
7. Seat cushion adjustment
8. Tilt adjustment

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4.2.15.3 Adjusting the Grammer operator's seat

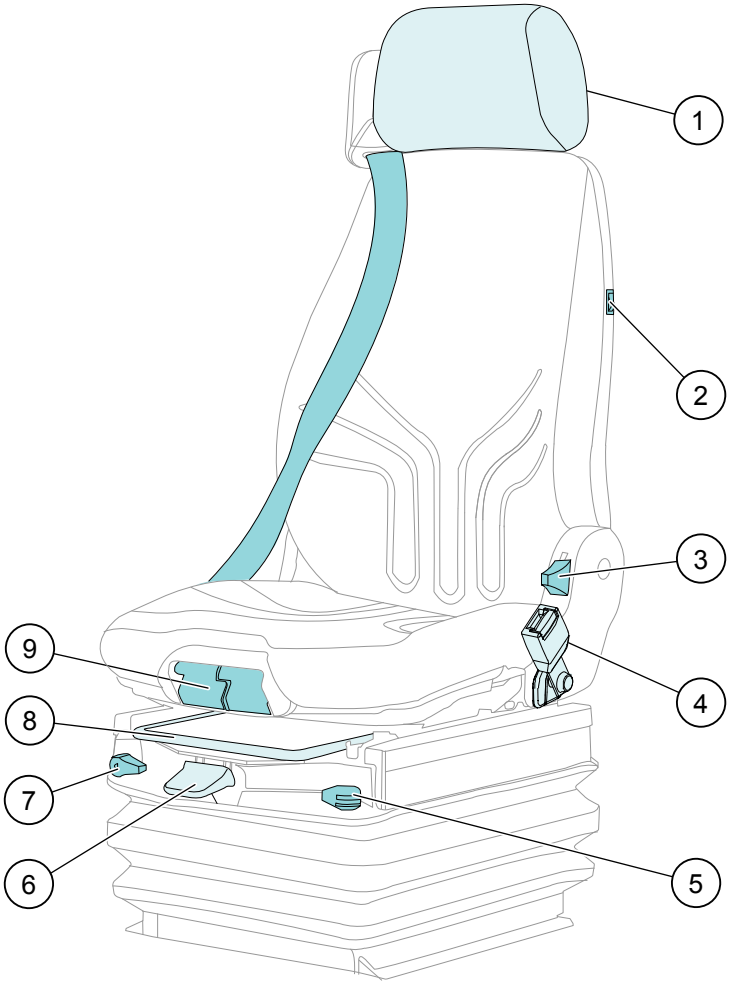

Figure 39. Controls for the Grammer operator's seat

1. Headrest (option)
2. Seat heating
3. Adjustable backrest angle
4. Integrated 3-point seat belt
5. Forward and backward isolator (lockable) [1)]
6. Height adjustment
7. Shock absorber (adjustable)
8. Forward and backward adjuster (170 mm)
9. Adjustable seat cushion depth and angle

[1)]Reduces horizontal vibration in the direction of travel, for a more comfortable ride on tough terrain.

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4.2.16 Adjusting the steering wheel

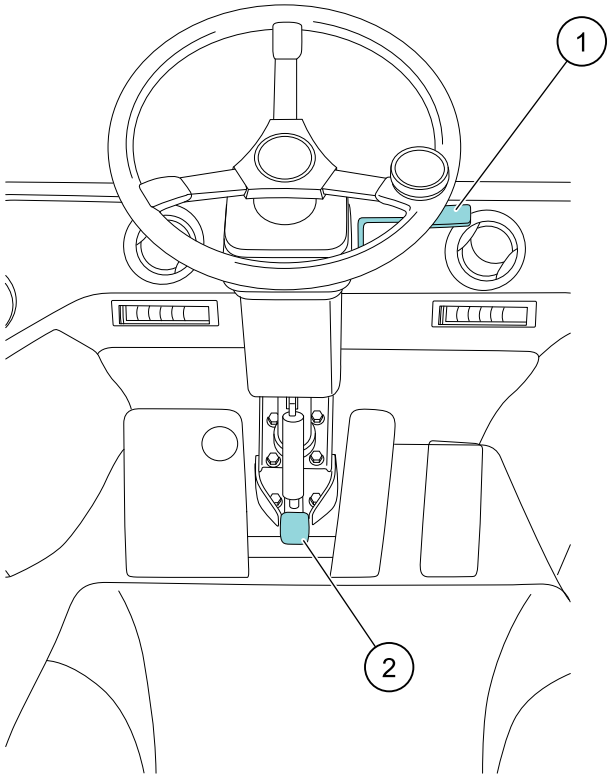

Figure 40. Controls for the steering wheel

1. Pull lever (1) upwards to adjust the height of the steering wheel.
2. Push lever (1) downwards to adjust the tilt of the steering wheel.
3. Step on the pedal (2) to adjust the angle of the steering column.

4.3 Hydraulic long life (HLL) filter (option)

4.3.1 Placement of the hydraulic long life (HLL) filter

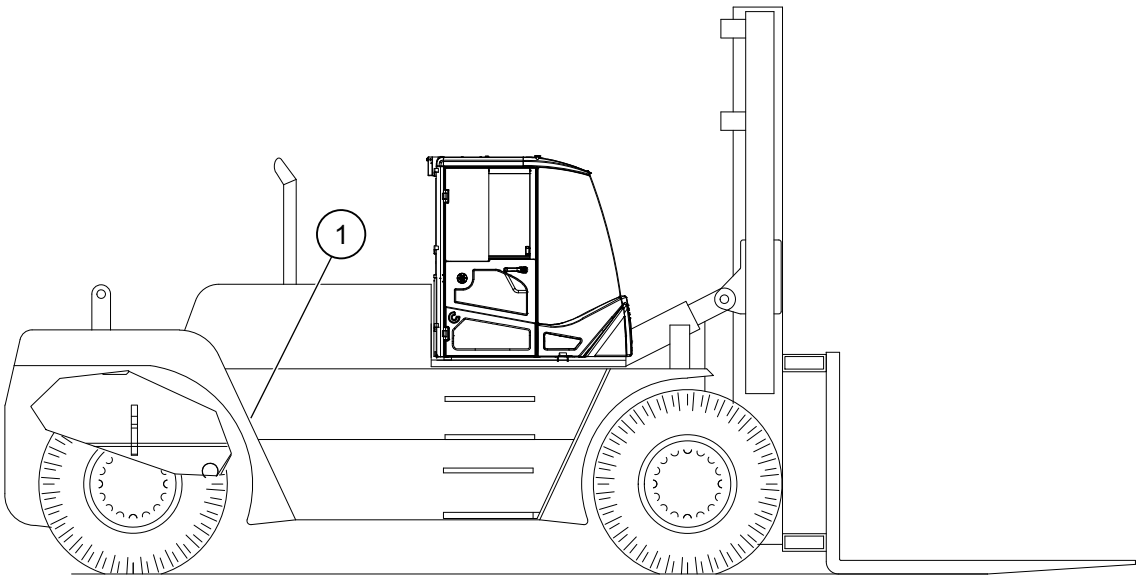

Figure 41. Placement of filter, SMV 10-16

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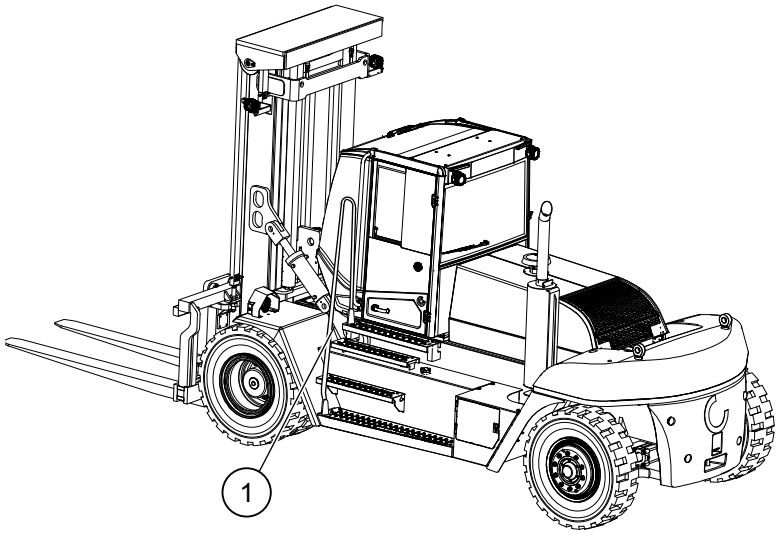

Figure 42. Placement of filter, SMV 18-60

1. Placement of the HLL filter

4.3.2 Checking the HLL filter

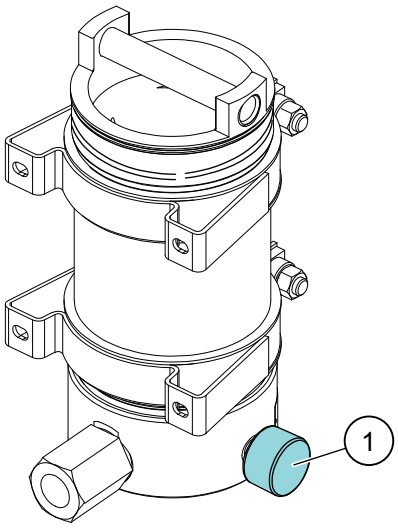

Figure 43. Pressure indicator

The pressure indicator (1) shows the status of the HLL filter, when the machine is on. If the indicator points towards the red area between service intervals, contact authorized maintenance personnel.

4.4 Engine After-treatment System (EATS) - Volvo stage V

The Engine After-treatment System (EATS) display page shows information concerning the "Selective Catalytic Reduction" system (SCR).

The SCR system includes information about "Nox Control Diagnostics" (NCD) and "Diesel Particle Filter" system (DPF) including "Particle Control Diagnostics" (PCD).

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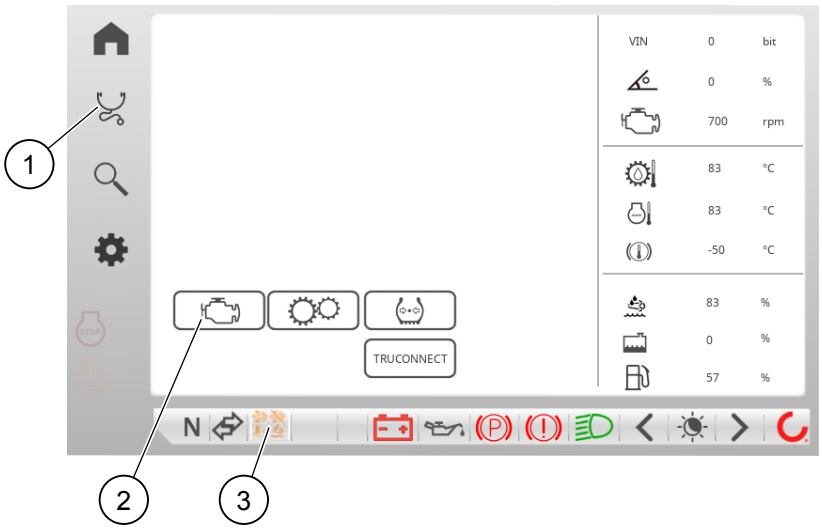

Figure 44. Machine overview page - Volvo stage V

1. Navigate to the **Machine overview page** (1).
2. Navigate to the **Emission page** (2).

NOTE ***The EATS display page can also be accessed by clicking the warning symbols (3) in the bottom frame.***

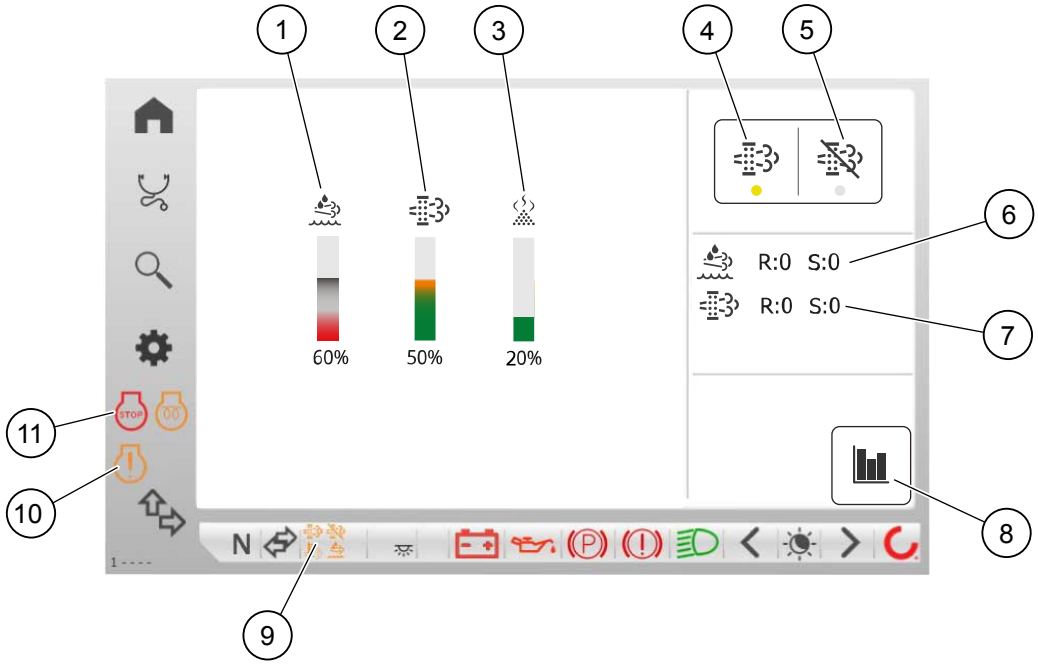

Figure 45. Emission page - Volvo stage V

1. AdBlue level indication
2. Soot level indication
3. Ash level indication
4. Parked regeneration "start" button
5. Parked regeneration "cancel" button
6. Reason and severity indication AdBlue level
7. Reason and severity indication soot level DPF
8. Engine diagnostics button

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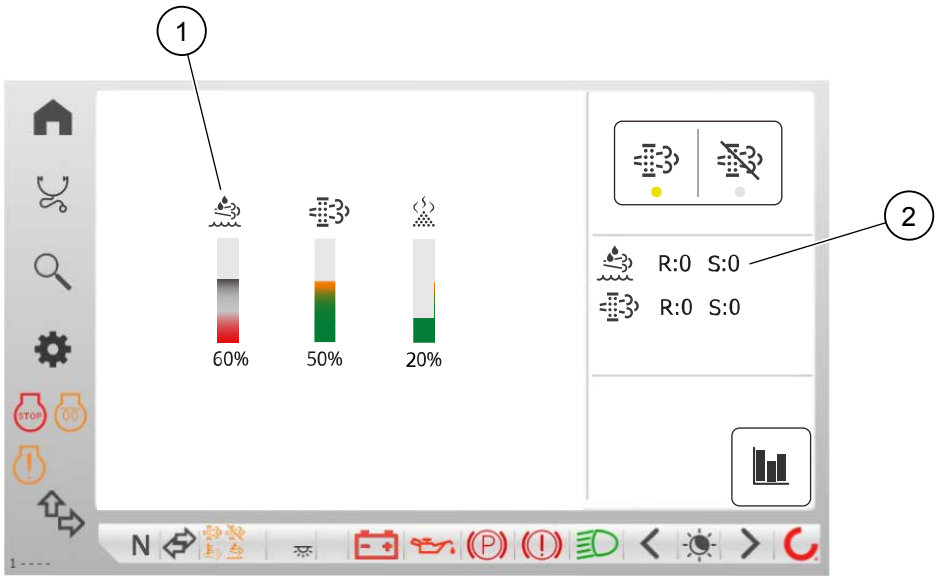
9. Warning symbols "Parked regeneration", "Parked regeneration cancel", and "AdBlue level" warning.
10. Engine warning
11. Engine stop

NOTE ***When the ash level indication (3) reaches 80%, the filter needs to be changed.***

4.4.1 Selective catalyst reduction (SCR) - Volvo stage V

Nox is one of the residual products during the combustion of diesel fuel. To reduce the Nox levels that the engine is fitted with an SCR system. The SCR system converts Nox into nitrogen and water using AdBlue.

NOTE ***If the AdBlue level is 0, the SCR system is not able to reduce the Nox levels.***



1. AdBlue level indication
2. Reason and severity indication AdBlue level

Nox control diagnostics (NCD) - Reason and severity

AdBlue is essential for the aftertreatment system (EATS) and is a part of the NCD. On the emission page, the reason and severity level codes are displayed with the letters R and S.

An NCD reason (R) value of 1 indicates a low AdBlue level. The NCD severity value (S) increases as the AdBlue level decreases.

NOTE ***If the reason (R) has a value other than 0 or 1, contact an authorized dealer.***

Figure 46. AdBlue level and severity values

There are four levels of severity depending on the AdBlue level and time:

DOC2730881A / en-US / 24 May 2024
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Table 6. Nox control diagnostics (NCD)

Nox control diagnostics (NCD) – Low AdBlue level				
AdBlue Level	**< 15%**	**< 6%**	**< 6%**	**< 6%> 7 min**
Severity	1	3	4	5
Active warning symbols	Solid amber Solid amber	Flashing amber Solid red	Flashing amber Solid red	Flashing amber Solid red
Derate	None	25% torque reduction	25% torque reduction	50% torque and 40% RPM reduction
Recommended action	**Refill AdBlue**	**Refill AdBlue**	**Refill AdBlue**	**Refill AdBlue**

4.4.2 Diesel Particulate Filter (DPF) - Volvo stage V

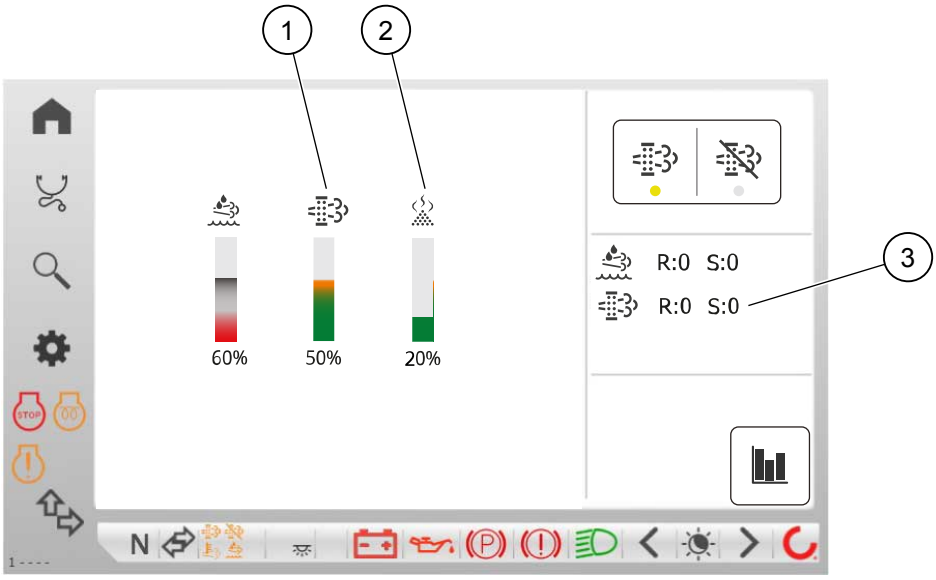

Figure 47. EATS emission page Volvo stage V

1. Soot level indication (1).
2. Ash level indication (2)
3. Reason and severity soot level DPF (3)

Passive regeneration

Soot is one of the residual products during the combustion of diesel fuel. The engine continuously strives to maintain the passive regeneration, which maintains a slow accumulation of soot in the DPF.

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The passive regeneration is sufficient to maintain an acceptable level of soot in the DPF under normal circumstances.

NOTE ***If the engine operates or idle at low RPM or is unable to reach a normal working temperature during operation, soot in the engine accumulates faster.***

NOTE ***When the ash level indication (2) reaches 80%, the filter needs to be changed.***

Particle Control Diagnostics (PCD)

The engine sends information about the status of the particulate filter. On the emission page, the error code is displayed with the letters R and S.

R shows the reason of the error and S shows the severity level. If an error occurs, different notifications are triggered depending on the severity level.

Soot accumulation is normal and gradual over time, it is therefore not part of the PCD. The R (reason) and S (severity) next to the DPF symbol should always show the value 0.

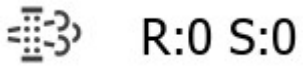

Figure 48. PCD reason and severity values

NOTE ***If R (reason) has a value other than 0, contact an authorized workshop.***

4.4.3 Parked regeneration - Volvo stage V

⚠ WARNING

IGNITION HAZARD

When a parked regeneration is performed, the exhaust gas temperature may exceed 500°C. If there are flammable or combustible materials, on or near the machine, the exhaust gas can cause a fire. Examples of such materials are paper, saw dust or fuel.

When performing a parked regeneration, the machine must be positioned in a well-ventilated area away from flammable material.

If possible, the machine should be parked on gravel.

Over time the DPF (Diesel Particulate Filter) will accumulate soot. The time that it takes depends on the machine operation. Performing a parked regeneration burns the soot and cleans the filter.

NOTE ***During the regeneration, the engine RPM gradually increases to 1400 RPM. During the regeneration, the parking brake cannot be released and the hydraulic functions are disabled.***

The procedure takes about 45 min, but can vary from 20–60 min depending on the current engine temperature and soot level. The engine RPM decreases to idle RPM and normal operation can be resumed when the regeneration is completed.

NOTE ***Operating or idling at low RPM and below normal operating engine temperatures causes the soot in the DPF to accumulate faster. The increasing level of soot makes the engine struggle to maintain the passive regeneration.***

NOTE ***When the soot level is 80%, the parked regeneration can only be initiated by "Volvo Penta" service dealers using VODIA (Volvo diagnostics).***

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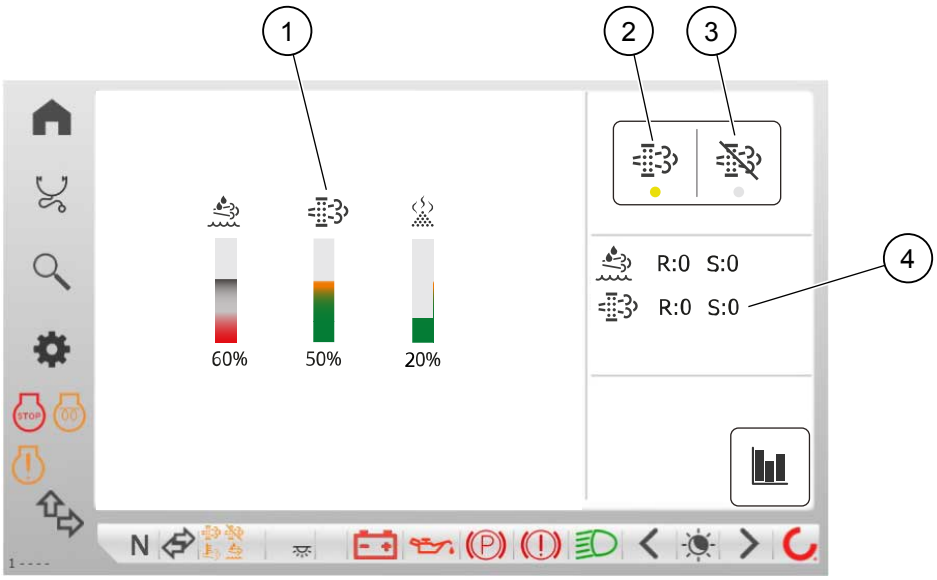

1. Soot level indication bar
2. Parked regeneration "start" button
3. Parked regeneration "cancel" button
4. Reason and severity indication soot level DPF (Diesel Particulate Filter)

To initiate a parked regeneration:

1. Position the machine in a safe location.
2. Check the fuel and AdBlue levels, top up if needed.
3. Select neutral gear.
4. Activate the parking brake.
5. Press the regeneration "start" button (2) for 2 s.

NOTE ***If an emergency occurs, press and hold the "cancel" button (3) for 0.1 s to stop the parked regeneration. The machine resumes normal operation.***

NOTE ***Always wait for the parked regeneration to complete. The procedure can be stopped four times in a row without completion. After five consecutive stops, the next parked regeneration can only be activated by a Volvo Penta dealer using VODIA (Volvo diagnostics).***

There are four different intervals of severity depending on the soot level:

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Table 7. Soot level severity

Soot level	0%–60%	61%–69%	70%–79%	80%–100%
Torque limit	No	No	No	Yes
Parked regeneration enabled	No	Yes	Yes	No
Active warning symbols	None	Solid amber	Flashing amber Solid amber	Flashing amber Solid red
Recommended action	**No action.**	**Time to start regeneration.**	**Start regeneration immediately.**	**Contact authorized workshop immediately.**

4.5 Engine aftertreatment System - Cummins engines

The Engine After-treatment System (EATS) display pages show information concerning the "Selective Catalytic Reduction" system (SCR).

The SCR system includes information about "Nox Control Diagnostics" (NCD) and "Diesel Particle Filter" system (DPF) including "Particle Control Diagnostics" (PCD).

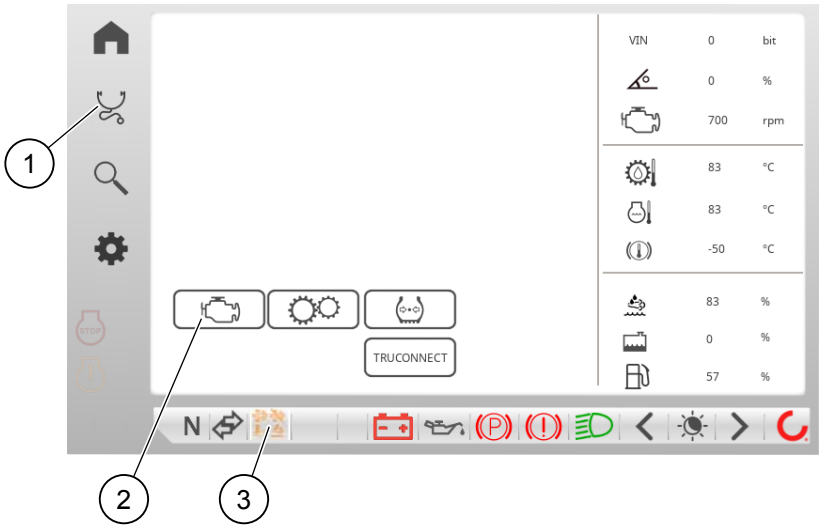

Figure 49. Machine overview page

1. Navigate to the **Machine overview page** (1).
2. Navigate to the **Emission page** (2).

NOTE ***The display page for the engine aftertreatment system can also be accessed by clicking the warning symbols in the bottom frame (3).***

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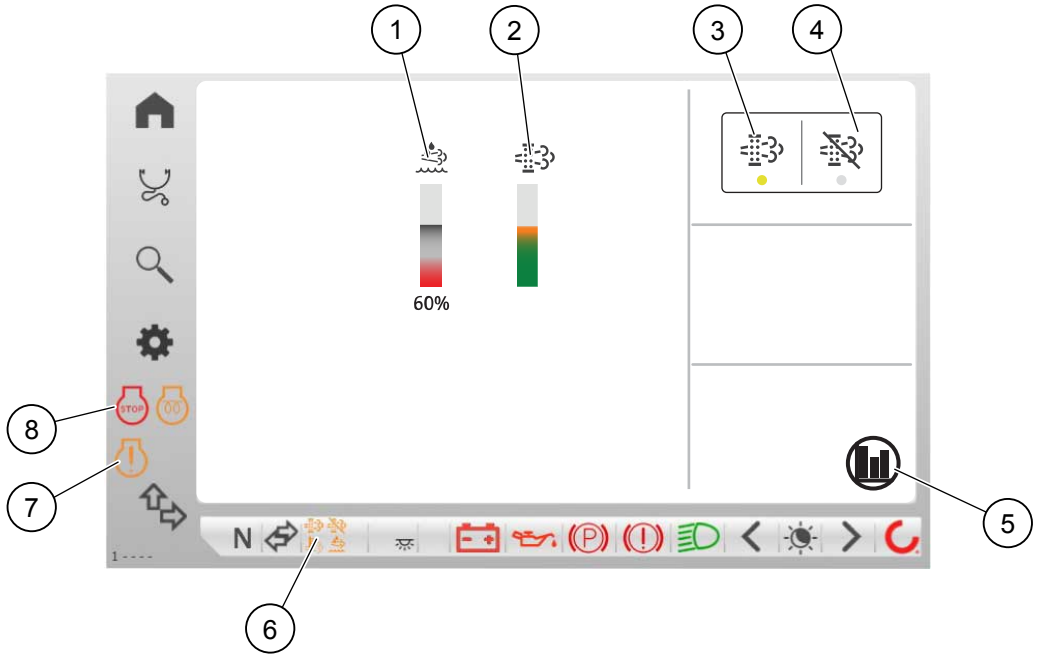

Figure 50. Emission page

1. AdBlue/DEF (Diesel Exhaust Fluid) level indication
2. Soot level indication
3. Parked regeneration "start" button
4. Parked regeneration "cancel" button
5. Engine diagnostics button
6. Warning symbols "Parked regeneration", "Parked regeneration cancel", and "AdBlue/DEF level" warning.
7. Engine warning
8. Engine stop

4.5.1 Selective catalyst reduction (SCR) - Cummins engines

Applicable for B 6.7 and X12 EU stage V / tier 4f, QSB 6.7 tier 4f

NOTE ***If the AdBlue/DEF level is 0, the SCR system is not able to reduce the NOx levels. High NOx levels reduce and limits the performance.***

Nitrogen Oxide (NOx) is one of the residual products during the combustion of diesel fuel. To reduce the NOx levels that the engine is fitted with an SCR system. The SCR system converts NOx into nitrogen gas (N2) and water using AdBlue/DEF (Diesel Exhaust Fluid).

NOx control diagnostics (NCD)

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NOx control diagnostics (NCD) – Low AdBlue/DEF level				
AdBlue/DEF Level	**< 10%**	**< 5%**	**< 2.5%**	**< 0%**
Severity	1-2	3	4	5
Active warning symbols	 Solid amber Solid amber	 Flashing amber Solid amber	 Flashing amber Solid red	 Flashing amber Solid red Solid red
Derate	None	No torque (1) and no engine RPM (2) reduction	50% torque (3) and 40% engine RPM (4) reduction	75% torque reduction and Engine idle RPM
Recommended action	**Refill AdBlue/DEF**	**Refill AdBlue/DEF**	**Refill AdBlue/DEF**	**Refill AdBlue/DEF**

(1) Starts to derate 5 min before reaching next severity level, down to 50% reduction.

(2) Starts to derate 5 min before reaching next severity level, down to 40% reduction.

(3) Starts to derate 5 min before reaching next severity level, down to 75% reduction.

(4) Starts to derate 5 min before reaching next severity level, down to "Engine idle RPM".

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4.5.2 Diesel Particulate Filter (DPF) - Cummins engines

Applicable for B 6.7 and X12 EU stage V / tier 4f

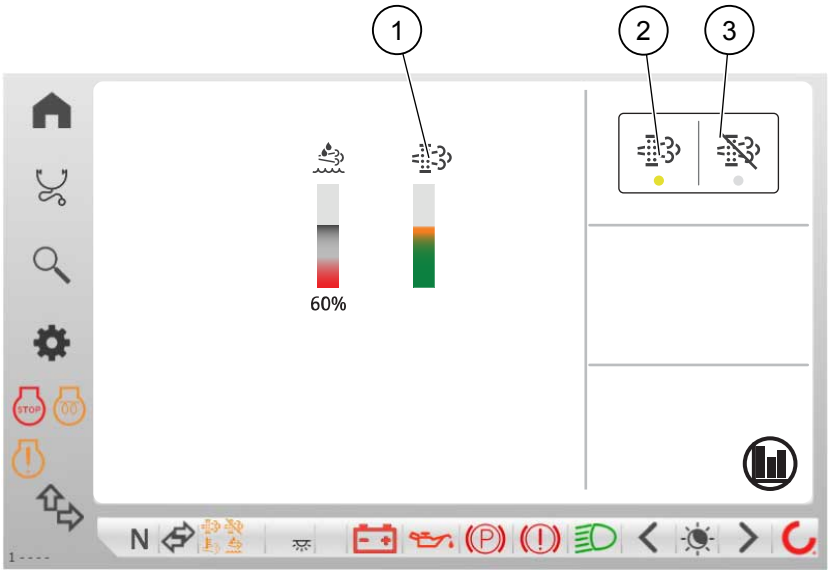

Figure 51. Emission page

1. Soot level indication.
2. Parked regeneration "start" button.
3. Parked regeneration "cancel" button.

Soot is one of the residual products during the combustion of diesel fuel. The engine control module (ECM) continuously controls the soot load in the DPF. The soot levels are shown on the display page and are presented on the soot level indicator. Above the indicator, the DPF symbol is displayed. When the different levels in the DPF are reached, they are transmitted to the VCU (Vehicle Control Unit).

NOTE ***If the engine operates or idle at low RPM or is unable to reach a normal working temperature during operation, soot in the engine accumulates faster.***

The following image shows the approximate soot level indications.

Passive regeneration

A passive regeneration can be initiated by the ECM (Engine Control Module). Usually, the passive exhaust system cleaning can be performed while the machine performs its normal functions and remains unnoticeable to the operator.

The passive regeneration provides the least disruption to the productivity of the machine.

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4.5.3 Parked regeneration - Cummins engines

Applicable for B 6.7 and X12 EU stage V / tier 4f

⚠ WARNING	
	IGNITION HAZARD **When a parked regeneration is performed, the exhaust gas temperature may exceed 500°C. If there are flammable or combustible materials, on or near the machine, the exhaust gas can cause a fire. Examples of such materials are paper, saw dust or fuel.** **When performing a parked regeneration, the machine must be positioned in a well-ventilated area away from flammable material.** **If possible, the machine should be parked on gravel.**

NOTE ***Operating or idling at low RPM and below normal operating engine temperatures causes the soot in the DPF (Diesel Particulate Filter) to accumulate faster. The increasing level of soot makes the engine struggle to maintain the passive regeneration.***

NOTE ***Always wait for the parked regeneration to complete. If the regeneration is interrupted two times within 30 min, a warning is shown in the display unit. If the regeneration is canceled three times within 30 min, or is interrupted five times, it is no longer possible to start regeneration using the display unit. Contact with an authorized service technician is required.***

NOTE ***If the button for cancel regeneration is pressed, both the automatic and the parked regeneration is disallowed. If the button is pressed when regeneration is active, regeneration is stopped. It is recommended by the engine supplier that the "cancel" button is only used when high exhaust temperatures may cause a hazardous condition.***

NOTE ***During the regeneration, the engine RPM gradually increases to 1400 RPM. During the regeneration, the parking brake cannot be released and the hydraulic functions are disabled. It is not possible to activate forward or reverse gear.***

Over time the DPF (Diesel Particulate Filter) will accumulate soot. The time that it takes depends on the machine operation. Performing a parked regeneration burns the soot and cleans the particulate filter.

The procedure takes about 45 min, but can vary from 20–60 min depending on the current engine temperature and soot level. The engine RPM decreases to idle RPM and normal operation can be resumed when the regeneration is completed.

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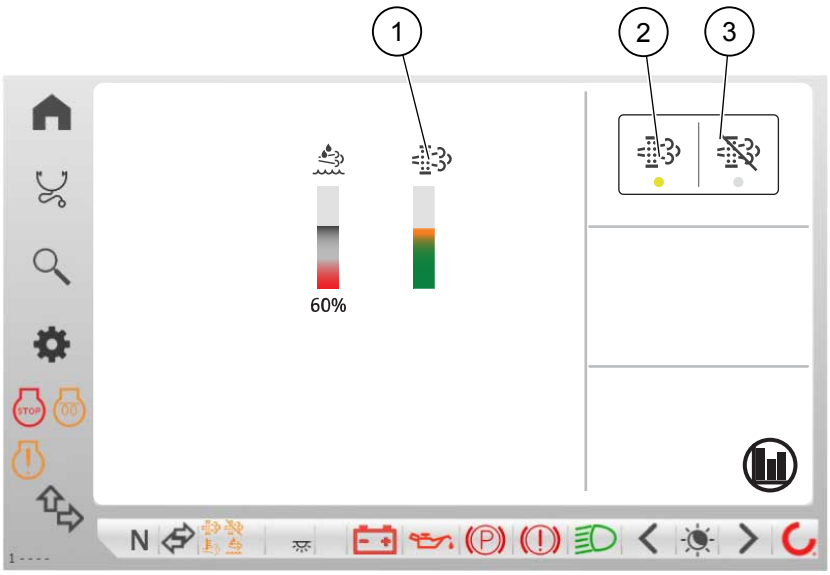
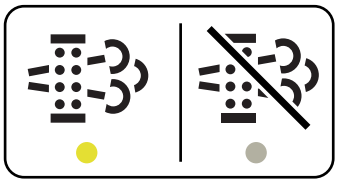


1. "Soot level indication" bar
2. Parked regeneration "start" button
3. Parked regeneration "cancel" button

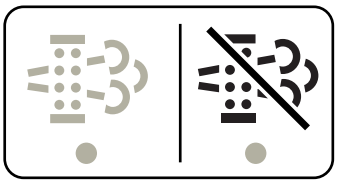
If high levels of soot are indicated, initiate a parked regeneration:

1. Position the machine in a safe location.
2. Check the fuel and AdBlue/DEF levels, top up if needed.
3. Select neutral gear.
4. Activate the parking brake.
5. Press the regeneration "start" button (2) for 2 s.

NOTE ***If an emergency occurs, press and hold the "cancel" button (3) for 0.1 s to stop the parked regeneration. The machine resumes normal operation.***



If regeneration is active, the indication light below the start regeneration button is lit.



If regeneration is not possible, due to low soot levels or if the "cancel" button has been pressed, the regeneration button is grayed out.

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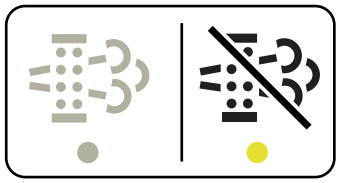

If regeneration has been canceled, the indication light below the cancel button is lit.

There are four different intervals of severity depending on the soot level:

Table 8. Soot level severity

Soot level	0%–60%	61%–69%	70%–79%	80%–100%
Reduction and Torque limit	No	No	No	Yes
Parked regeneration enabled	No	Yes	Yes	No
Active warning symbols	None	Solid amber Solid amber	Flashing amber Solid amber	Flashing amber Solid red
Recommended action	**No action.**	**Time to start regeneration.**	**Start regeneration immediately.**	**Contact authorized workshop immediately.**

4.5.4 Diesel Oxidation Catalyst (DOC) - Cummins engines

Applicable for QSB 6.7 tier 4f

Diesel Oxidation Catalyst (DOC) is an aftertreatment component that converts carbon monoxide (CO) and hydrocarbons into carbon dioxide (CO2) and water vapor. DOC works in a passive mode and require no active regeneration or other special requirements.

The DOC component breaks down pollutants in the exhaust stream from the engine. DOC also reduces particulate matter (PM) through a chemical reaction that requires no cleaning or maintenance.

Exhaust flows through the Engine Aftertreatment System (EATS), and passes from the turbo through the DOC. Even after the DOC collects particles from the harmful substances in the exhaust, it still contains Nitrogen oxide (NOx).

NOx levels are reduced by using AdBlue/DEF (Diesel Exhaust Fluid). See Selective catalyst reduction (SCR) - Cummins engines (page 116).

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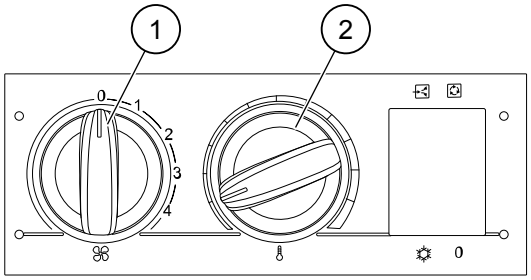
4.6 Using the cabin heating and ventilation



1. Fan speed
2. Heat control

1. To select the desired fan speed, turn the left handle (1).
2. To control the temperature, turn the right handle (2).

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4.7 Using the cabin ventilation (option)

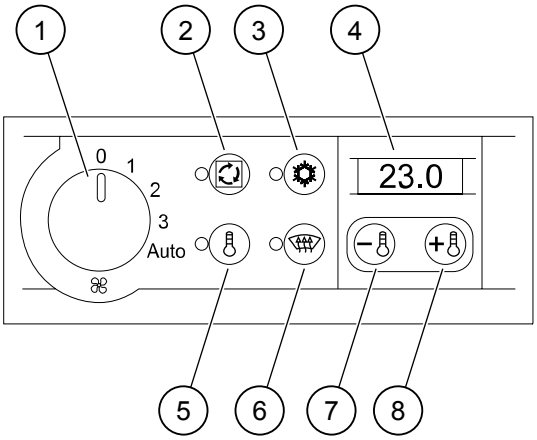

Figure 52. Cabin ventilation

A lamp lights up when a function (2, 3, 5, 6) is active. Press again to deactivate.

1. Fan speed
2. Air recirculation
3. Air conditioning
4. Temperature display
5. Display outside temperature
6. Defrost
7. Temperature control -
8. Temperature control +

The cabin temperature is controlled by a heating/air conditioning unit with a motorized water valve and an external air flap. The temperature display (4) shows the inside temperature you have set for the cabin. You can set the value 18°C…28°C (corresponding to 64°…82°F).

Set the temperature by pressing the - and + buttons (7, 8).

Press (5) to display the outside temperature on the 4-digit display (4). To switch the unit of temperature between Celsius and Fahrenheit, press (5) for more than 20 s.

Controls may vary according to customer options.

Tips for working with the air conditioning:

- To reduce humidity in the cabin, operate the machine with the air conditioning system on.
- Recirculated air helps to cool down the cabin faster.
- When driving and with normal humidity, use external air intake.
- To reduce fog build-up during humid weather, and ice during cold weather, use the defroster.

4.8 Driver login (option)

NOTE ***If the machine is shut down and restarted, the login code of the operator must be reentered.***

1. When opening one of the **Main pages**, a pop-up screen (1) appears.

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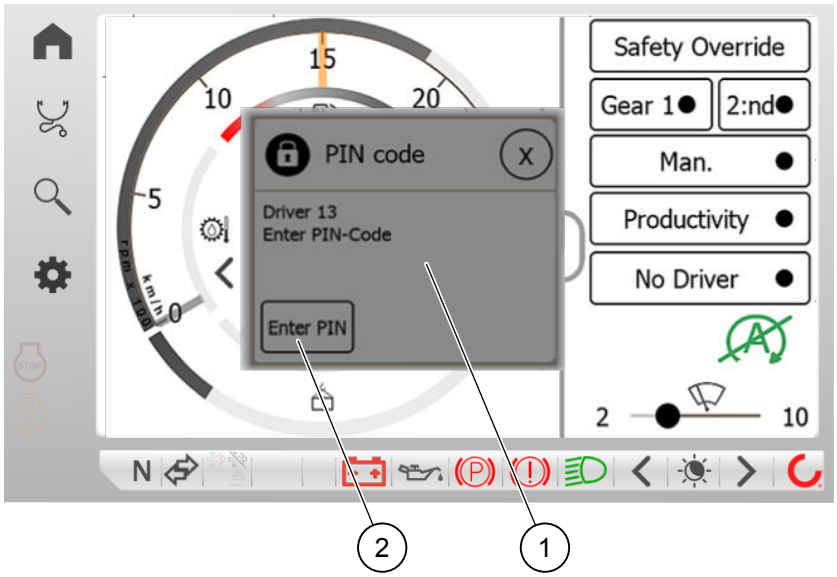
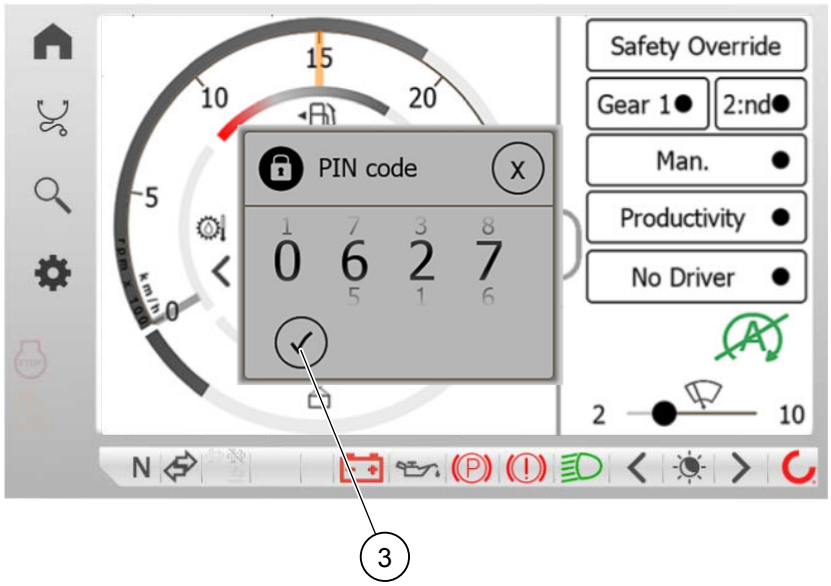


2. Press **Enter PIN** (2).



3. Enter the personal login code and press (3).

4.9 Changing the operator

If the operator changes, the login code of the new operator must be entered.

Figure 53. Operator's button on the right side

1. On any of the **Main pages**, tap the button on the right side to open the **Operator's menu**.

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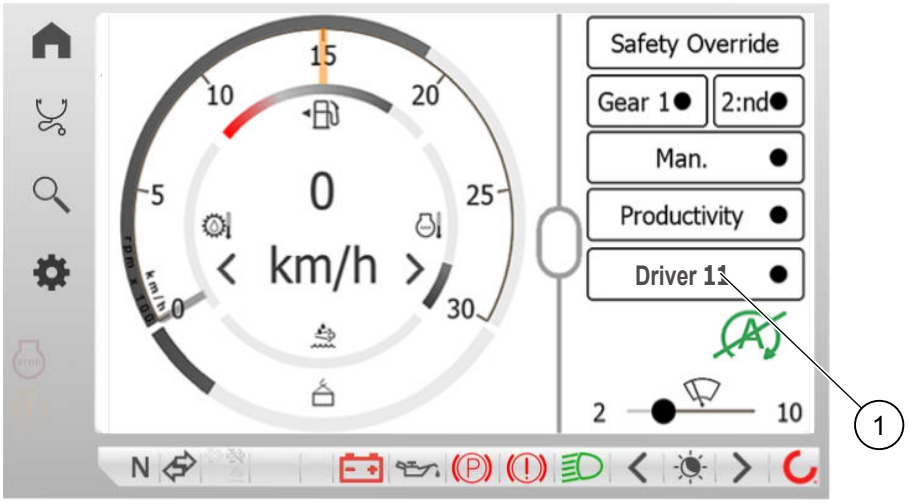
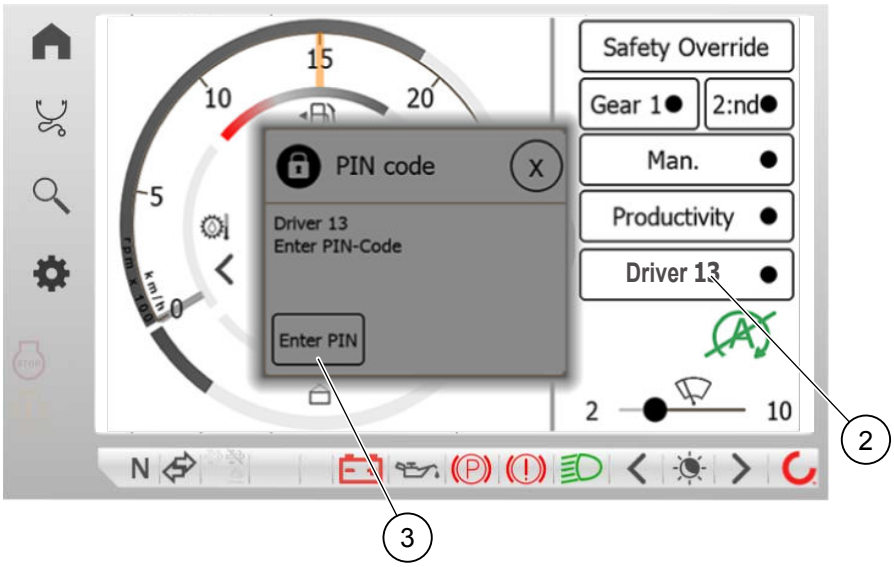


2. Press the driver selection button (1) , a drop-down menu opens.



3. Select your driver's number from the drop-down menu, for instance, **Driver 13** (2).
4. A pop-up window opens. Press **Enter PIN** (3).

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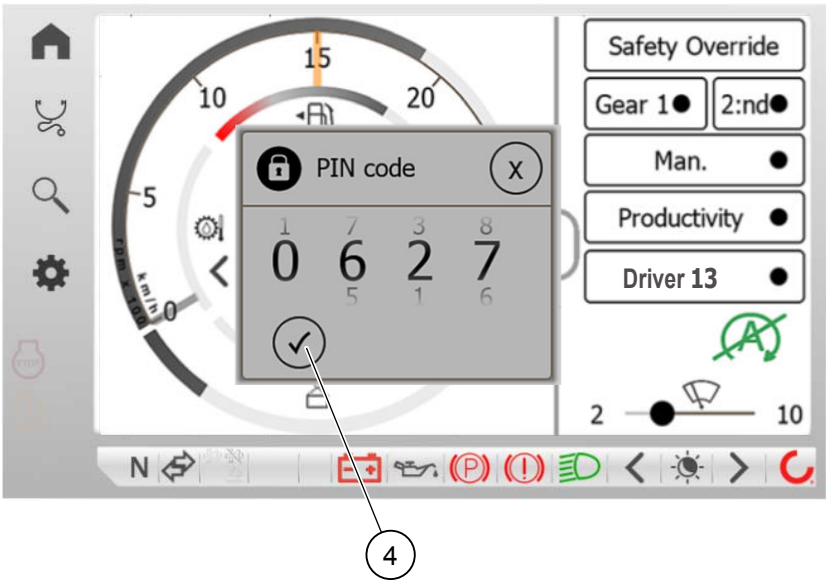

5. Enter your personal login code and press (4)
   Now you can start the machine.

4.10 Break-in period

The machine can be driven at full speed right from the start. However, prolonged maximum loading of the hydraulic system and transmission must be avoided during the first 50 hours of operation.

After the first 150 hours, perform the first service. For more information, see the maintenance instruction.

4.11 Steering and braking

4.11.1 Steering

To minimize unnecessary wear and tear to the tires, turn the steering wheel only when the machine is moving.

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4.11.2 Using the electrical mini-wheel steering (option)

DANGER

MOVING MACHINE HAZARD

Losing control of the steering system of the machine can cause material damage, personal injury, or death.

If the system detects a fault in the electrical mini-wheel steering system, a warning buzzer sounds in the cabin. The operator must then use the ordinary steering wheel.

DANGER

MOVING MACHINE HAZARD

Losing control of the steering system of the machine can cause material damage, personal injury, or death.

If any faults or malfunctions with the mini-wheel steering system is detected, the machine must immediately be taken out of use. Maintenance staff must be contacted.

The mini-wheel is an ergonomic feature that helps to reduce stress on the shoulders and back of the operator.

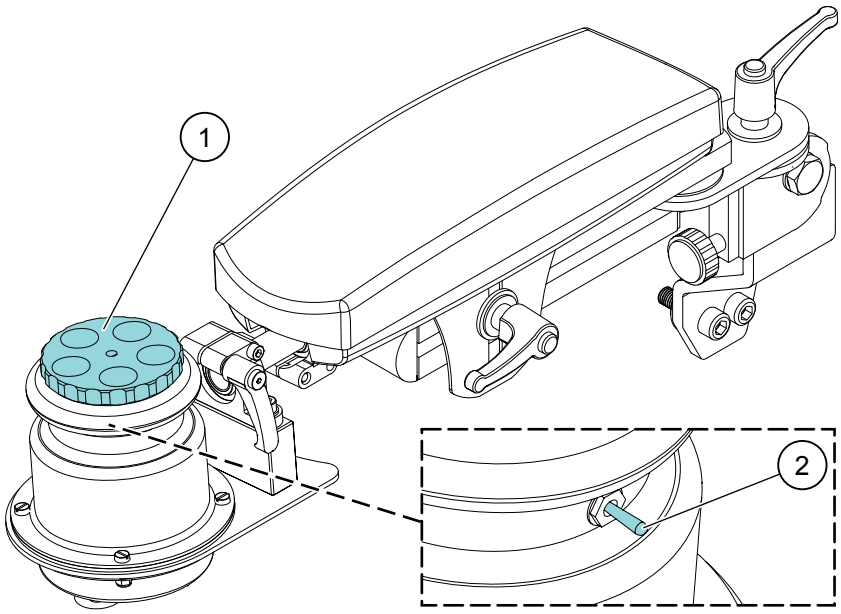

Figure 54. Mini-wheel steering

1. Mini-wheel steering
2. F-N-R switch

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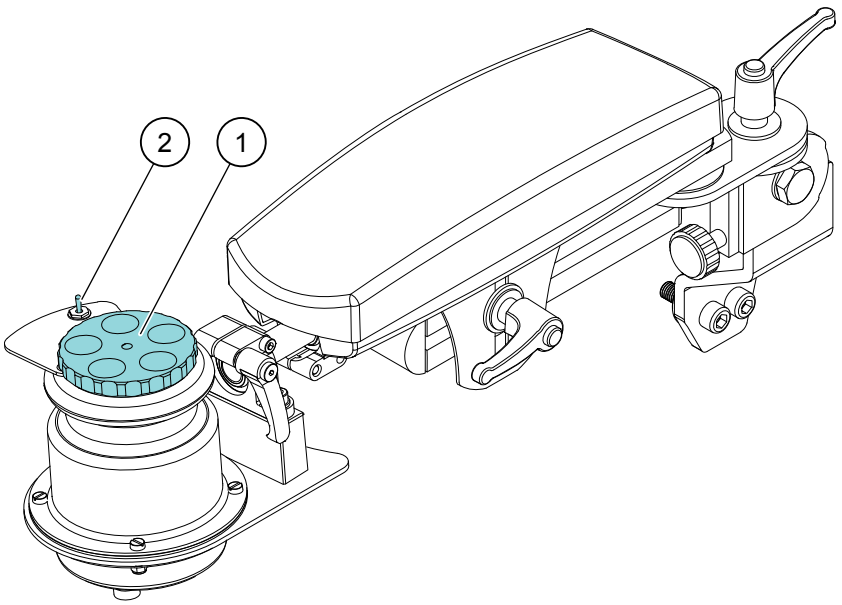

Figure 55. F-N-R mini-wheel steering

1. Mini-wheel steering
2. F-N-R switch

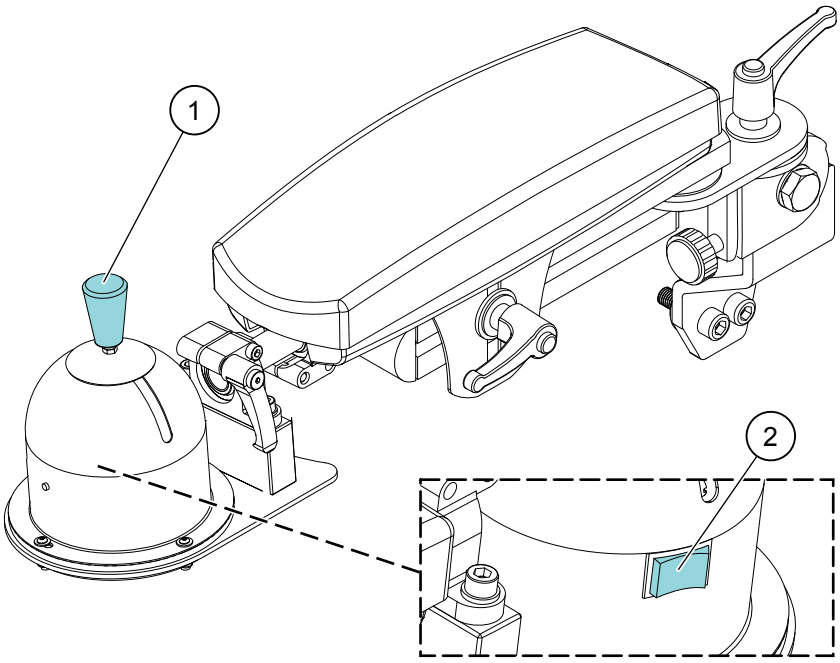

Figure 56. Dome lever steering

1. Lever steering
2. F-N-R switch

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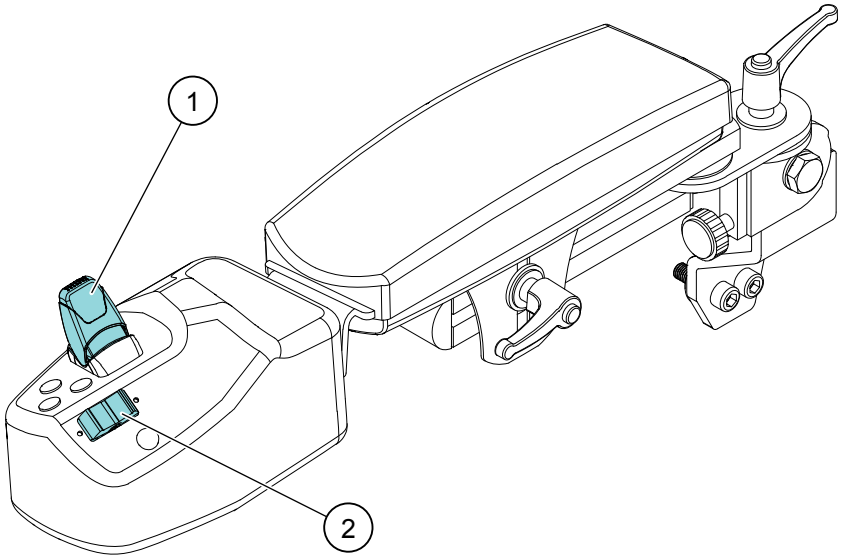
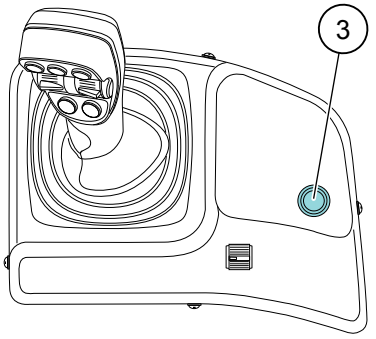


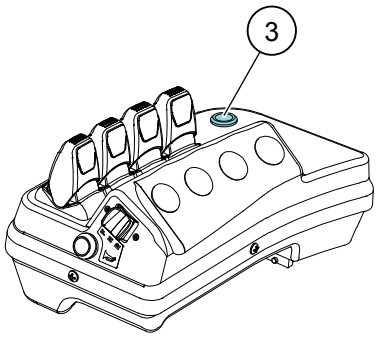
Figure 57. Lever steering

1. Lever steering
2. F-N-R switch

NOTE ***It is always possible to steer the machine with the ordinary steering wheel. When the ordinary steering wheel is in use, the mini-wheel steering is deactivated.***

NOTE ***The main steering wheel retains priority over mini-wheel steering in case you must grab it suddenly.***





1. To activate mini-wheel steering, press the button (3).
2. To deactivate mini-wheel steering, press the button (3) again.

NOTE ***The F-N-R switch is disabled when the mini-wheel steering function is deactivated.***

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4.11.3 Force neutral when braking

The function "force neutral when braking" helps avoid abnormal wear on the brakes. When the driving speed is higher than 4 km/h, and the operator presses the brake pedal the gear is forced into neutral.

When the operator releases the brake, the gear is reactivated.

NOTE ***When using the inching brake function, "force neutral when braking" is not activated.***

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4.11.4 Activating the declutch

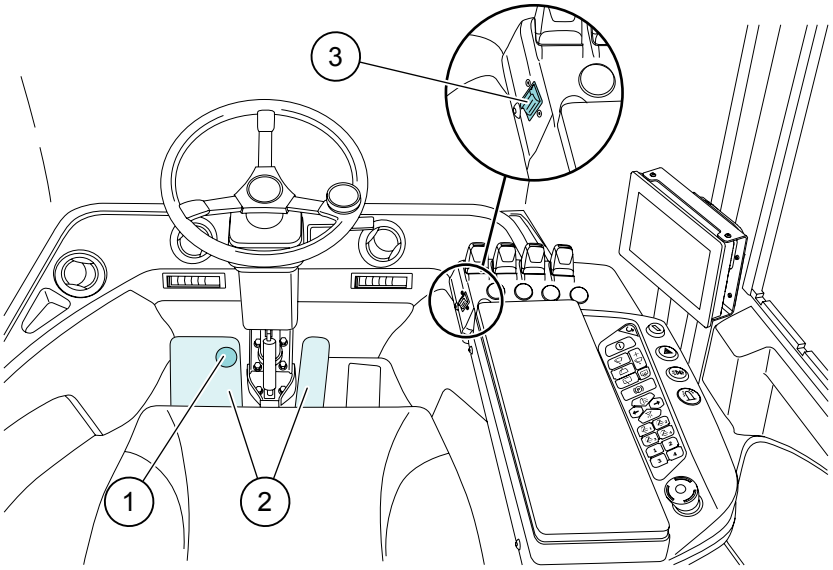

Figure 58. Activating the declutch, cabin with levers

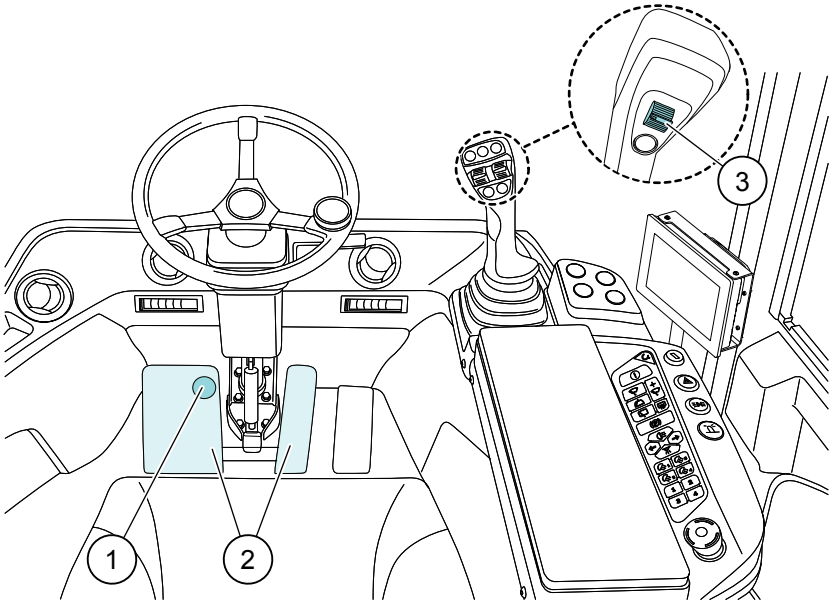

Figure 59. Activating the declutch, cabin with joystick

The declutch switch (1) disengages the transmission, and enables the operator to control the hydraulics while maintaining a high engine RPM.

During stacking maneuvers, this function prevents overheating of the engine, transmission, or brakes.

The additional benefits are that the reverse or forward gear can remain activated.

1. To activate the declutch, press the declutch switch (1).
2. If you press the declutch switch (1) at the same time as the brake pedal (2), the brakes are applied. When you brake using only the brake pedal (2), the declutch is not activated.

NOTE ***If the gear switch (3) is in forward or reverse position, the transmission is activated again when releasing the pressure on the declutch switch (1).***

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4.11.5 Activating the declutch, with pressure switch (option)

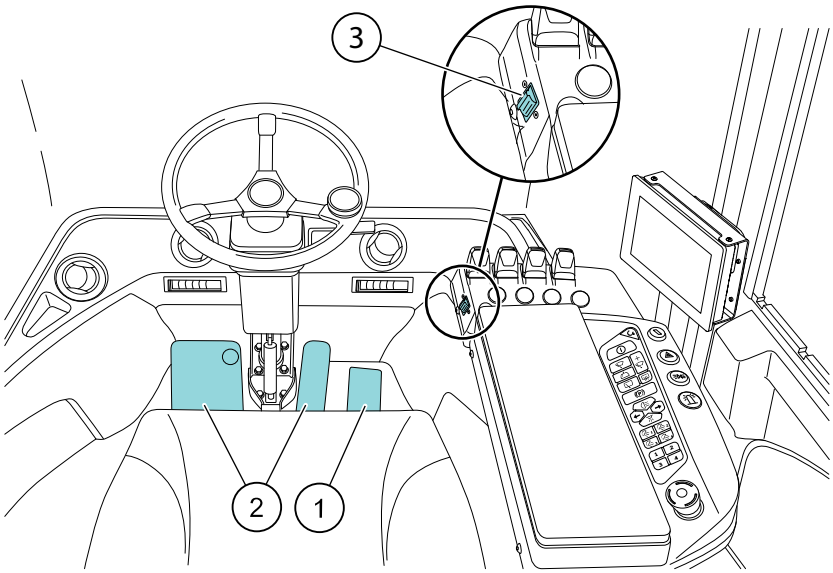

Figure 60. Activating the declutch with pressure switch

The declutch with pressure switch disengages the transmission depending on the brake pressure. When the brake pressure exceeds approximately 30 bar, the transmission disengages (Neutral). This function enables the operator to control the hydraulics while maintaining a high engine RPM without overheating the engine, transmission, or brakes during stacking maneuvers.

1. To activate the pressure switch, press either the left or the right brake pedal (2).
2. Control the lifting speed by pressing the accelerator pedal (1).

NOTE ***If the gear switch (3) is in forward or reverse position, the transmission is reactivated when the brakes are released.***

4.11.6 Activating the inching function (option)

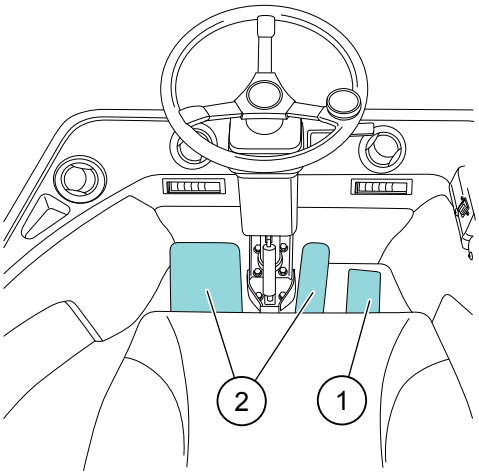

Figure 61. Activating the inching function

The inching function disengages the transmission depending on, and parallel to the brake pressure.

The inching function enables a smooth propulsion in parallel with an effective lifting speed.

1. To activate the inching function, press either the left or the right brake pedal (2).

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2. Control the lifting speed by pressing the accelerator pedal (1).

NOTE ***The higher brake pressure, the lower propulsion.***

NOTE ***When using the inching function, "force neutral when braking" is not activated.*** ***Force neutral when braking (page 130)***

4.11.7 Parking

⚠ WARNING

RISK OF UNINTENDED MOVEMENT
The parking brake can fail and cause unintended movement.
Park the machine on level ground.

Before parking the machine:
- Make sure that the forks are fully lowered.
- Tilt the mast forward, the fork tips must touch the ground.
- Park the machine on level ground.

NOTE ***To hold the machine still while working on slopes with up to 15% inclination, the parking brake can be used.***

1. Use the service brake to bring the machine to a standstill.
2. Select neutral gear.
3. Activate the parking brake.
4. Turn off the ignition.
5. Wait until the AdBlue pump has stopped.

NOTE ***After parking the machine, make sure to switch off the battery main switch.***

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4.11.8 Activating the parking brake

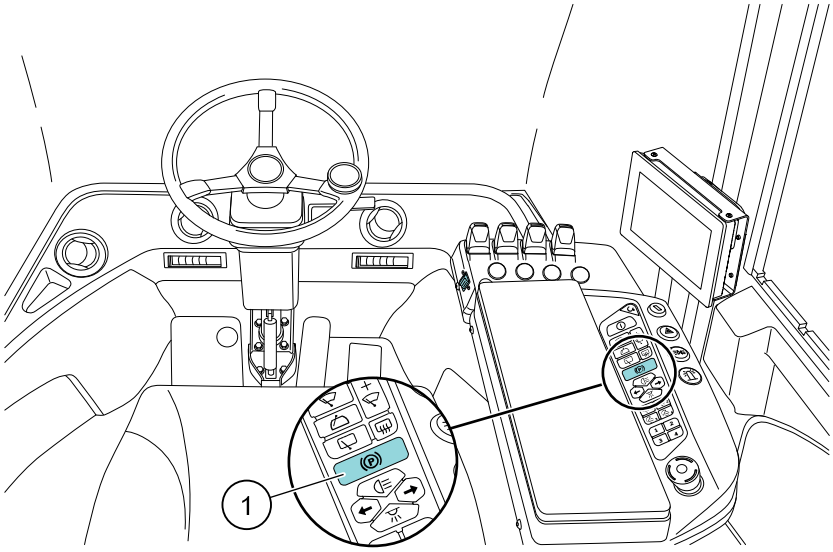
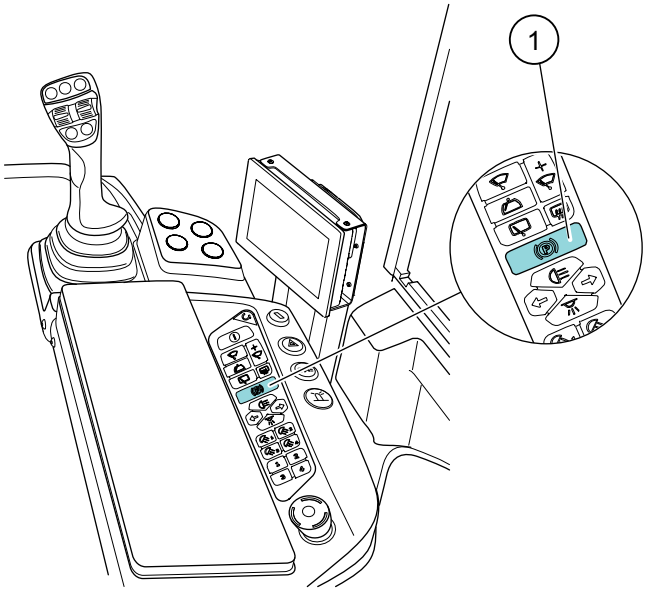


Figure 62. Parking brake, cabin with levers



If the operator leaves the seat without activating the parking brake, an audio signal is activated.

NOTE ***Check the function of the parking brake daily. Contact your authorized dealer, or maintenance personnel if the parking brake does not function properly. If there is doubt, they can ensure that the parking brake is in a safe condition to use.***

1. Bring the machine to a standstill, using the service brake.
2. Select the neutral gear.
3. Press (1) to activate the parking brake.

4.11.9 Automatically applied parking brake (option)

The parking brake is activated automatically, when there is no signal from the seat switch sensor. The machine must be stationary, for the parking brake to be activated.

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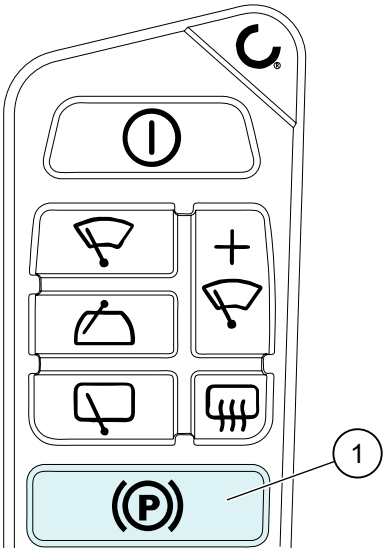


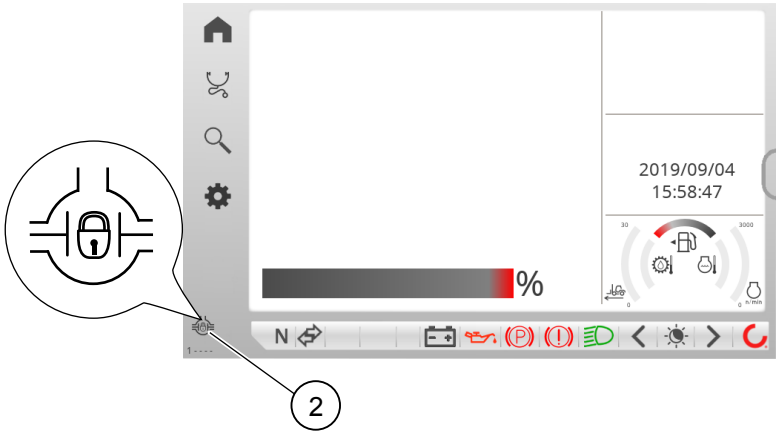
To release the parking brake again, the parking brake button (1) on the keypad must be pressed.

4.11.10 Differential lock function (option)

WARNING	
	RISK OF DAMAGE TO THE MACHINE **Wrong usage can damage the axle drive line parts** **Only use the function when operating with low and bad traction (when driving in snow, ice, or mud).** **Do not use for long-distance driving.** **Only apply the differential lock when the machine stands still.** **Do not drive with full engine power.** **No steering is allowed when the differential lock is applied.** **Only use the differential lock when driving forwards.**

The differential lock function enables the possibility to have the same propulsion power and speed on all drive wheels. The differential lock function can be used to stabilize the forward propulsion when operating with bad and low traction (such as snow, ice, or mud).

The following symbol (2) is shown in the display when the differential lock function is activated:



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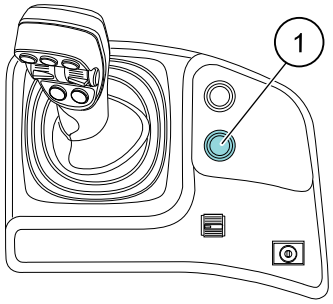

1. Slow down the machine to a standstill.
2. Press the activation button for the differential lock (1).
3. Drive slowly forwards max speed 5 km / hour.
4. Slow down the machine to a standstill.
5. Press the activation button (1) again to deactivate the differential lock.

4.12 Sideways sliding cabin

⚠ DANGER

PERSONAL INJURY HAZARD

When the cabin is sideways positioned, the distance to the ground is high. A fall from this height, can cause serious personal injury or death.

If the cabin is sideways positioned, do not exit the cabin on the right side.

In an emergency situation, when the left door is blocked, use the emergency hammer and exit through the rear window.

⚠ WARNING

PERSONAL INJURY HAZARD

If walking in the area to the right of the cabin, when the cabin is sideways positioned, there is a risk of tripping. Tripping causes a risk of serious personal injury.

Be careful when moving in this area, preferably return the cabin to normal position before exiting the cabin.

⚠ WARNING

RISK OF DAMAGE

When moving the cabin sideways, there is a risk of colliding with objects or persons in the surrounding area. There is a risk of personal injury and damage to the machine.

Make sure that there is enough space to slide the cabin sideways.

Make sure that there are no personnel near the area when moving the cabin.

⚠ WARNING

LIMITED VISIBILITY HAZARD

The working range of the machine is large and visibility from the operator's cabin is limited. Risk of serious personal injury and damage to the machine

Before you start to move the machine, check that the road ahead is free and that you have an unobstructed view.

If the view forwards is obstructed, use the sideways sliding feature to change the position of the cabin. If the view is still obstructed, drive in reverse.

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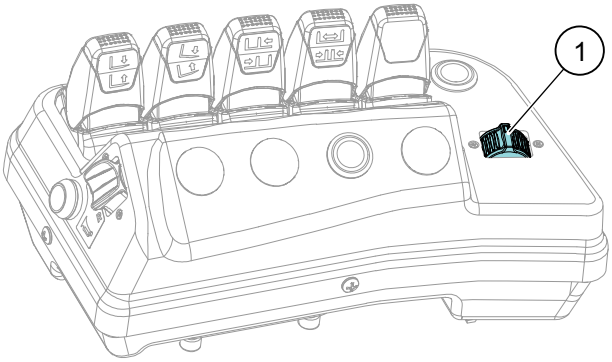
NOTE ***The cabin must be in end position, either in normal position, or in sideways position to be able to operate the machine.***

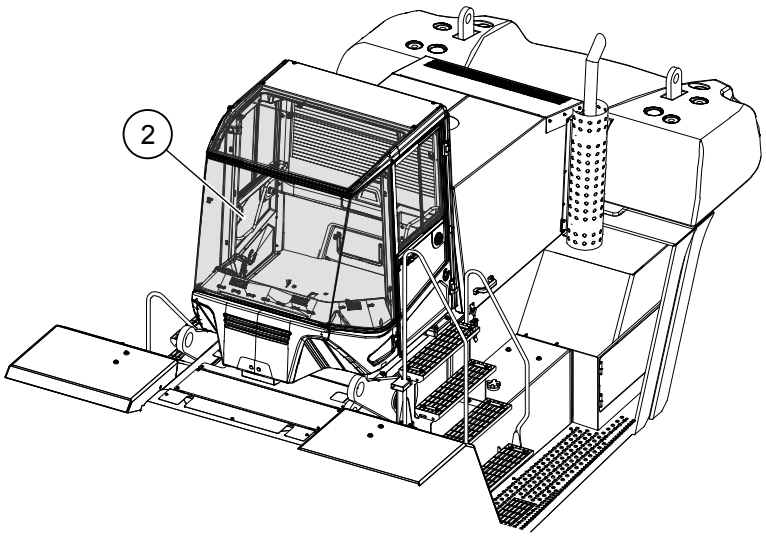
The sideways sliding cabin function is an option which enables the operator to change the position of the cabin. The feature can be used when the view is obstructed when operating the machine.

The function is hydraulic, and the following criteria must be fulfilled move the cabin:
- Engine runs
- Parking brake is engaged



1. Use the switch (1) to move the cabin sideways.

NOTE ***The cabin moves proportionally depending on the angle of the switch. When the switch is released, the cabin movement stops.***



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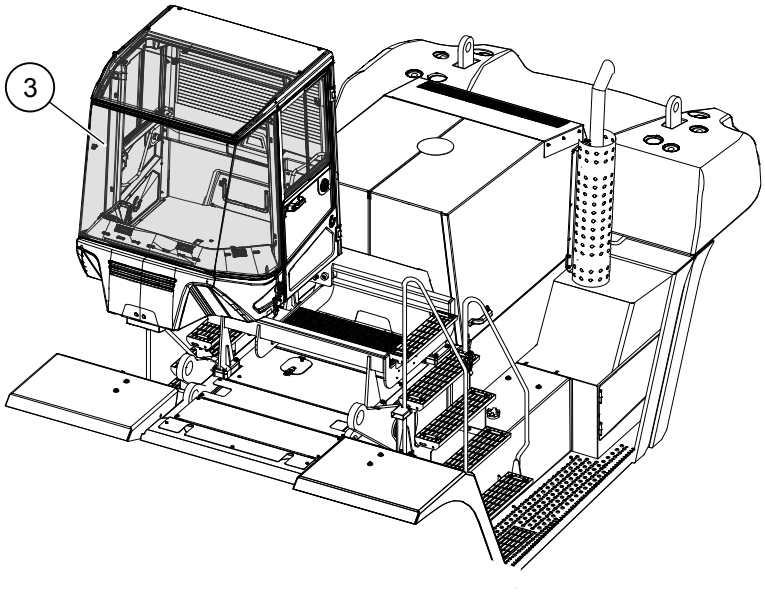
2. Cabin in normal position (2).



3. Cabin positioned sideways (3).

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4.13 Using the 180° rotating seat (option)

⚠ WARNING

PERSONAL INJURY HAZARD

If the operator is not correctly positioned in the seat, the rotating movement could cause personal injury.

When rotating the seat, wear a seat belt, and make sure that legs and arms are safely positioned.

Make sure that seat, and backrest settings does not interfere, when rotating the operator seat.

⚠ WARNING

CRUSH INJURY HAZARD

If there are several persons in the cabin when rotating the seat, there is a risk of personal injury due to the rotating movement. There is a risk of getting pinned between the seat and the cabin.

When rotating the seat, the operator must make sure that there are no other persons in the cabin.

When rotating the seat, the operator must make sure that there are no other items, such as bags, or jackets, in the cabin.

NOTE ***Make sure to not release the hand and foot switches before the seat is fully rotated to 180°. If any of the switches are released too early, the seat returns to either a forward or reverse position. Depending on the position of the seat when releasing the switches, the seat can also stop between end positions. If so, the parking brake cannot be released and a warning is shown in the display.***

NOTE ***When the seat rotates, the hydraulic functions are disabled. When the seat is fully rotated to end direction, facing forwards, the hydraulic functions are enabled. When the seat is fully rotated to end direction, facing backwards, the hydraulic functions are disabled.*** [1)]

NOTE ***When equipped with "Armrest inclination sensor" (option), it is not possible to rotate the seat when the armrest inclination is more than 45°.***

[1)] All hydraulic functions, can be activated in the settings. For more information, contact Konecranes Lift Trucks, or an authorized dealer.

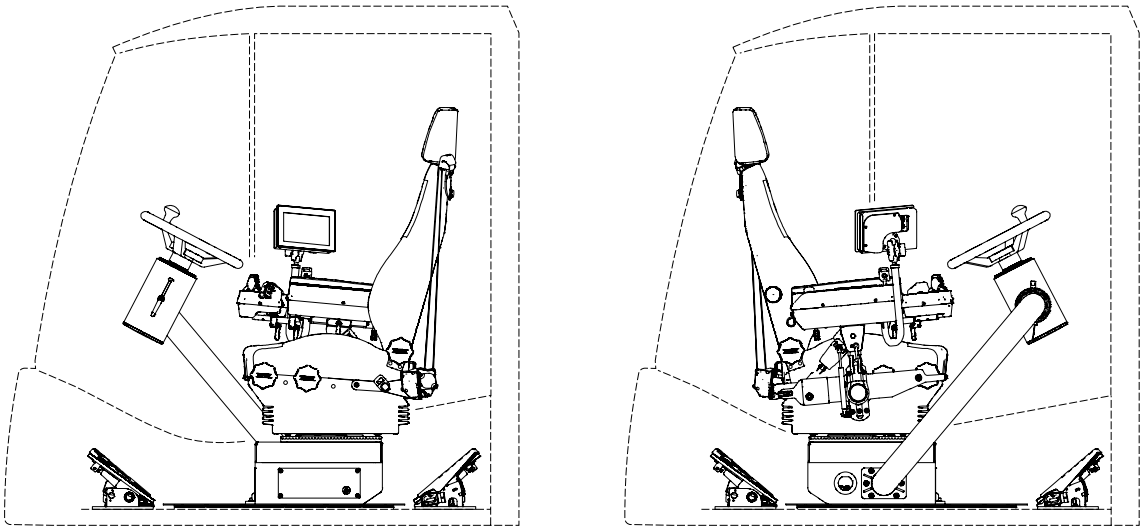

Figure 63. Rotating seat in forward driving position (left) and reverse driving position (right)

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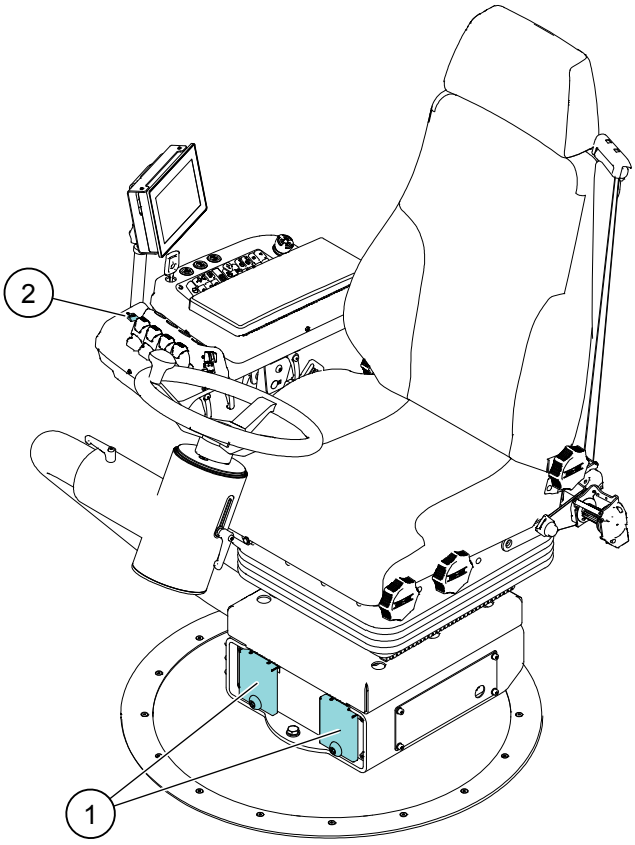
The rotating seat option allows the operator to rotate the seat 180° for reverse driving. As this feature eliminates the need for reversing, it decreases strain and stress on the operator. Rotating seat also gives a better view of the rear and increases safety when driving.

The steering wheel rotates together with the seat, but there are pedals on both sides of the cabin.

When the seat is rotated, the following changes take place:

- The turning directions of the steering wheel adapt to the new driving direction.
- The lights adapt to the new driving direction.
- The gear switch adapts to the new driving direction.



1. Bring the machine to a standstill.
2. Make sure that the machine is in neutral.
3. Apply the parking brake.
4. Press both feet against the two switches (1) under the seat.
5. Activate the switch (2) for seat rotation on the armrest.
6. Keep pressing the switches (1) and (2) until the seat has rotated fully to 180°.
7. Release the switches (1) and (2).
   The machine can now be driven in the opposite direction. If the accelerator pedal is not pressed within 10 s, the parking brake must be disengaged manually, by pressing the parking brake button.

When finished, rotate the seat back to the original position by following the same procedure.

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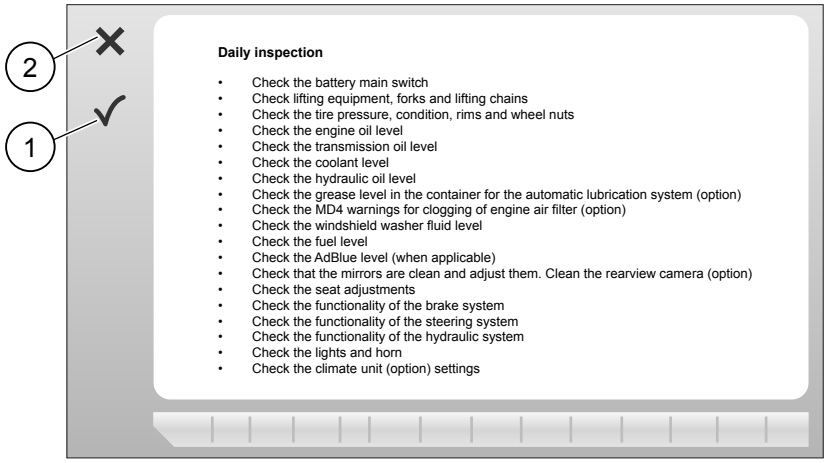
4.14 Operating

4.14.1 Daily inspection before operation (option)



When starting the machine for the first time each day, a checklist is displayed. The operator must go through the list and confirm that the machine functions as expected before the engine can be started.

Press the check mark button (1) to confirm the functions. If a fault is detected during the inspection, press the cross button (2).

NOTE ***If a fault is detected, evaluate the problem, contact maintenance personnel if needed. When the problem is solved, start the machine again.***

If the machine passes all the tests, and the inspection is confirmed, it is possible to start the engine. The status of the inspection is transmitted to TRUCONNECT®. When no status is uploaded, the machine sends “No status” to TRUCONNECT®.

4.14.2 Operating - general information

To be able to start the machine, the operator needs to be identified. The machine can be started in the following ways:

- Ignition key - for more information see: Starting the engine (page 142)
- Ignition key and driver login with code - for more information see: Driver login (option) (page 123)
- RFID - for more information see: Starting the engine, with RFID tag (option) (page 144)

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4.14.3 Starting the engine

⚠ WARNING	
	TOXIC SUBSTANCE HAZARD **Breathing diesel engine exhaust exposes you to chemicals that may cause cancer, birth defects or other reproductive harm.** **Never run the engine in unventilated places. Use fume extraction.** **Do not keep the engine idling, except when necessary.** **Do not modify or tamper with the exhaust system.**

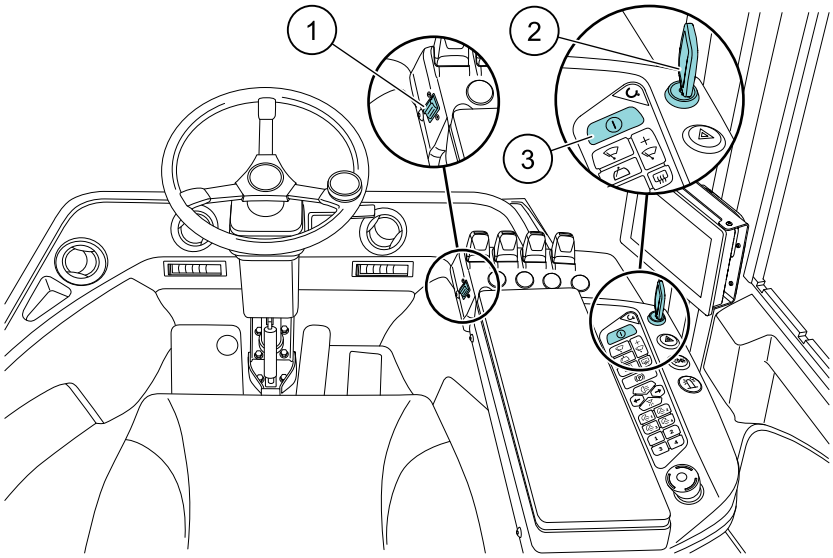

Figure 64. Starting the engine, cabin with levers

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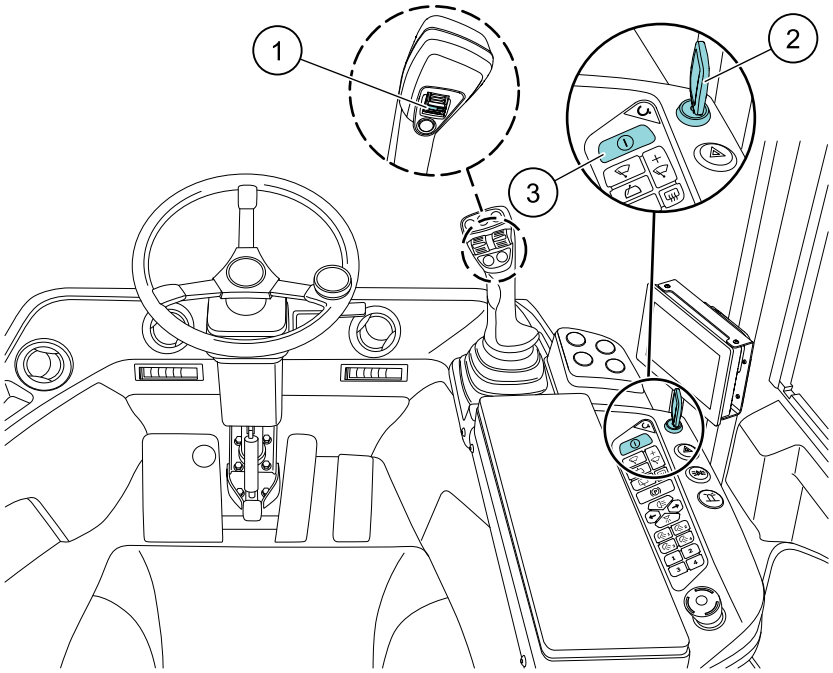

Figure 65. Starting the engine , cabin with a joystick

1. Position yourself in the operator’s seat.
2. Ensure that the gear switch (1) is in neutral.
3. Insert the ignition key (2).
4. Turn the key clockwise.
5. Wait until the display shows the home page.
6. Press the start button (3). The engine starts.

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4.14.4 Starting the engine, with RFID tag (option)

⚠ WARNING

TOXIC SUBSTANCE HAZARD

Breathing diesel engine exhaust exposes you to chemicals that may cause cancer, birth defects, or other reproductive harm.

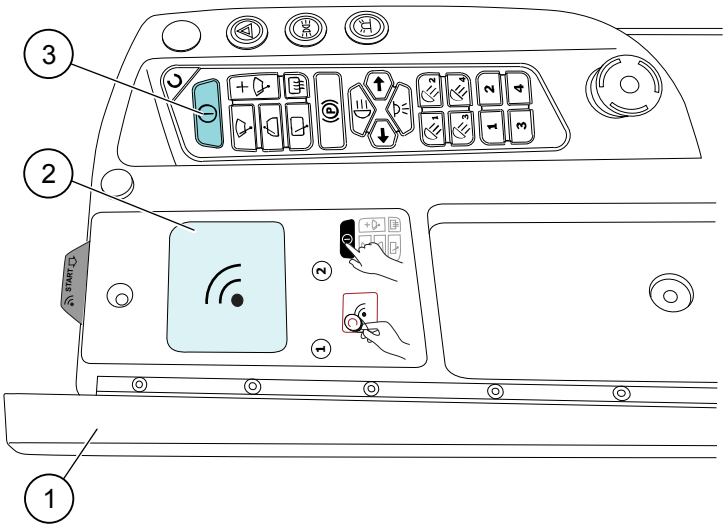
Never run the engine in unventilated places. Use fume extraction.

Do not keep the engine idling, except when necessary.

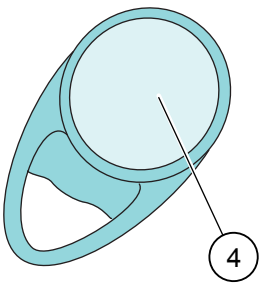
Do not modify or tamper with the exhaust system.

The RFID (Radio-frequency identification) tag identifies the operator and is used to start and stop the machine. If the RFID tag is used, it replaces the ignition key, there can be up to 200 individual tags/machine.

1. Position yourself in the operator's seat.
2. Ensure that the gear switch is in the neutral gear.



3. Lift the cover of the armrest (1).



4. Swipe the RFID tag (4) over the RFID reader (2).
5. Wait until the display shows the home page.
6. Press the start button (3). The engine starts.

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4.14.5 Stopping the engine

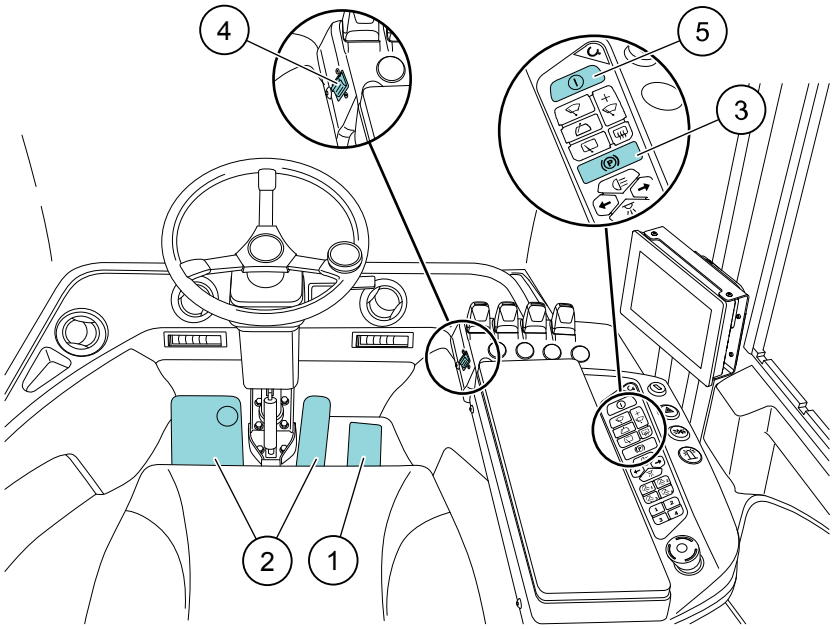
⚠ WARNING

RISK OF DAMAGE TO THE MACHINE

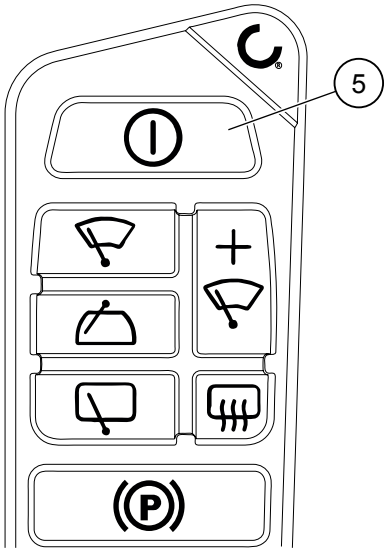
If you do not let the turbo slow down before turning off the engine, there is a risk of turbo damage.

Allow the engine to idle for a few minutes before turning of the engine.

NOTE ***Use the emergency stop only in an emergency situation. For more information, see Emergency stopping (page 34).***



1. Release the accelerator pedal (1).
2. Apply the service brakes (2) and bring the machine to a standstill.
3. Select the neutral gear (4).
4. Activate the parking brake (3). See Activating the parking brake (page 134).
5. Let the engine idle for a few minutes.
6. To stop the engine, press the **start/stop** button (5).



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7. Turn the ignition key anti-clockwise.

NOTE ***The engine and the ignition are now both turned off.***

8. If you leave the machine unsupervised, turn off the battery main switch. For more information, see Battery main switch (page 35)

NOTE ***Do not turn off the battery main switch before the engine has stopped.***

NOTE ***If the machine has en engine that uses diesel exhaust fluid (DEF) solution (AdBlue), turn off the engine, but do not turn off the battery main switch. Wait for the DEF pump to finish pumping back all the fluid from the hoses to the DEF tank before turning off the battery main switch (1).***

4.14.6 Stopping the engine, with RFID tag (option)

⚠ WARNING	
	RISK OF DAMAGE TO THE MACHINE **If you do not let the turbo slow down before turning off the engine, there is a risk of damaging the turbo.** **Allow the engine to idle for a few minutes before turning off the engine.**

NOTE ***Use the emergency stop only in an emergency situation. For more information, see Emergency stopping (page 34).***

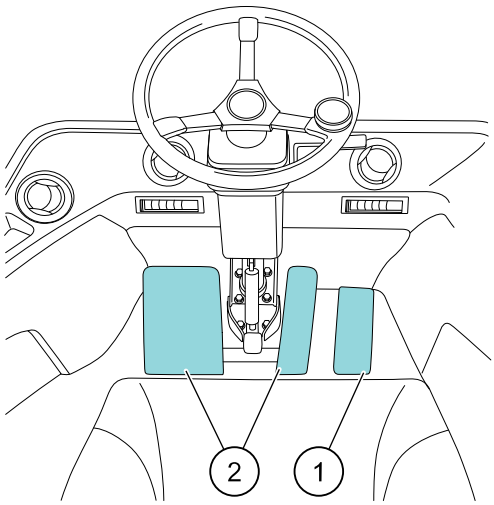

Figure 67. Stopping the engine

1. Release the accelerator pedal (1).
2. Apply the brakes (2) and stop the machine.

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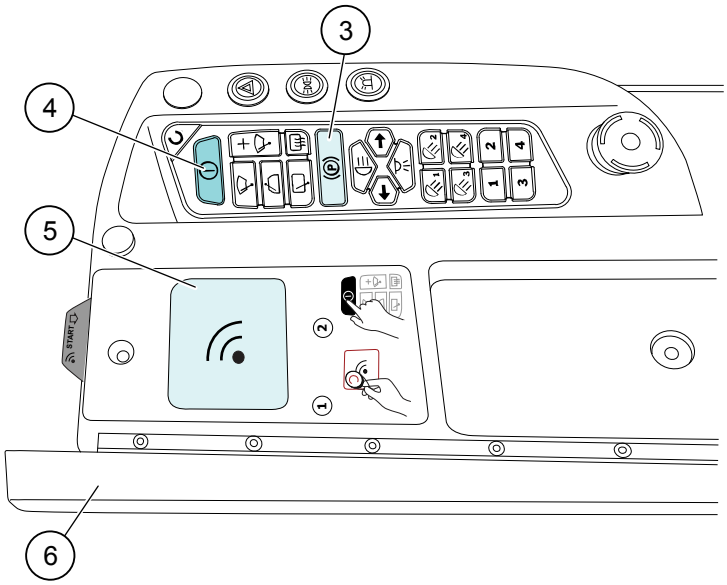
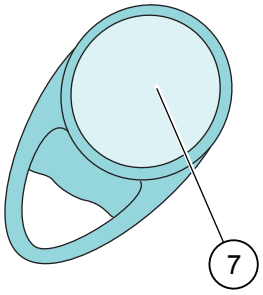


3. Activate the parking brake (3).
4. Ensure that the gear switch is in the neutral gear.
5. To stop the engine, press the **start/stop** button (4).
6. Lift the cover of the armrest (6).



7. Swipe the RFID tag (7) over the RFID reader (5) to switch off the ignition.

NOTE ***The machine must be in a standstill to use the RFID tag (7) to switch off the ignition.***

NOTE ***If you leave the machine unsupervised, switch off the battery main switch.*** ***Battery main switch (page 35)***

NOTE ***Do not turn off the battery main switch before the engine has stopped.***

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4.14.7 Operating the machine

DANGER

RISK OF TIPPING

If driving with the load placed higher than the recommended transport position, the machine can roll or tip. Risk of death, serious injury and damage to the machine.

If needed, reverse from stack, and lower the load to transport position before driving away.

WARNING

RISK OF DAMAGE TO MACHINE HAZARD

Keeping the machine idling or operating at low load for long periods of time may cause oil leak, increased levels of soot, and damage the engine.

Do not keep the machine idling or operating at low load for long periods of time.

WARNING

SIDEWAYS TILTING HAZARD

Driving on uneven terrain may damage the machine. Driving on surfaces with insufficient support may cause the machine to roll or sink. Risk of serious personal injury and damage to the machine.

Drive the machine only on level ground that is intended for the total weight and ground pressure of the machine.

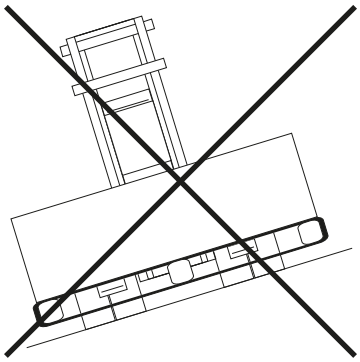

Figure 68. Do not drive on uneven terrain

WARNING

HIGH-VOLTAGE HAZARD

Electric arcing can cause burns or electrocution even without direct contact with the power line.

Be careful when operating the machine near electricity power lines.

WARNING

LIMITED VISIBILITY HAZARD

The working range of the machine is large and visibility from the operator's cabin is limited. Risk of serious personal injury and/or damage to the machine.

Before you start to move the machine, check that the road ahead is free and that you have an unobstructed view.

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⚠ WARNING

RISK OF LOAD DROP

Driving downhill on slopes carrying a load, can lead to a load drop. This can damage the machine and can lead to serious personal injury.

If carrying a load, always drive downhill in reverse.

⚠ WARNING

TIPPING AND COLLISION HAZARD

If you drive on slopes greater than 15%, the brakes may fail to stop the machine and machine may roll. Risk of serious personal injury and damage to the machine.

Do not drive on slopes greater than 15%.

NOTE ***If you must drive the machine along greater slopes, contact your Konecranes Lift Trucks authorized dealer.***

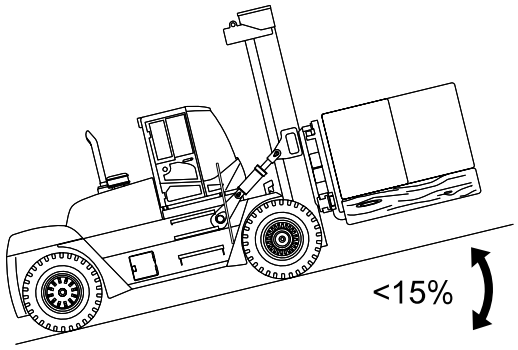

Figure 69. Do not drive on slopes steeper than 15%

- The machine is not intended for off-road driving.
- The machine is not equipped with wheel suspension.
- Always adjust your method of driving to the condition of the road (bumps, and so on), to hazards within the working area and the load.
- The indicated hill-climbing capacity of the machine in the data sheet is based on the pulling power of the machine. It applies only to driving over obstacles and minor irregularities in ground level.

NOTE ***If leaving the seat when operating the machine, the transmission is forced into neutral. The gear must be reactivated when returning. Due to the "Operator presence" function, the operator must sit in the seat to activate the seat switch for the propulsion and the hydraulics.***

1. Start the engine.
2. Lift just enough to still maintain a clear view above the load.
   If the load is so large it obstructs your view, drive the machine in reverse for better visibility.
3. Hold the steering wheel steady. Always use the whole of your hand to hold the wheel knob.

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4.14.8 Driving forwards

NOTE ***For more information regarding transport position of the forks, see Lifting and driving with a load (page 161).***

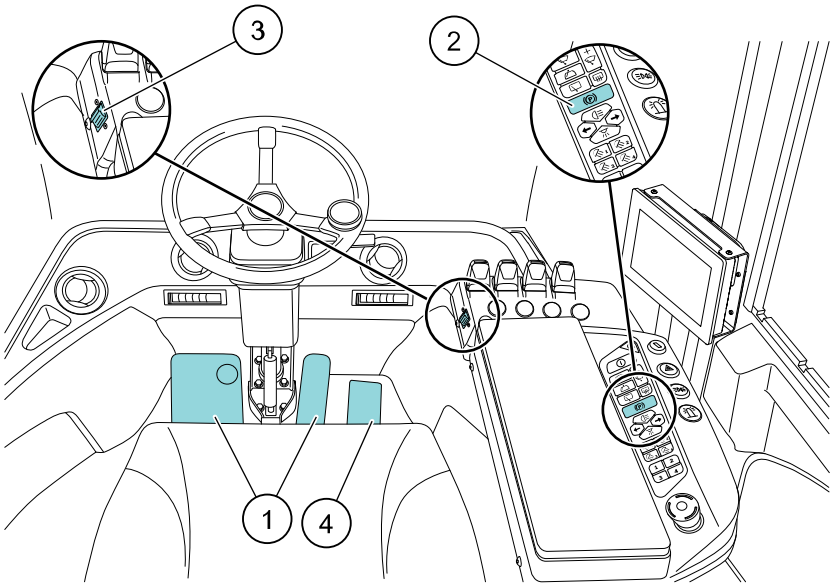

Figure 70. Driving controls, cabin with levers

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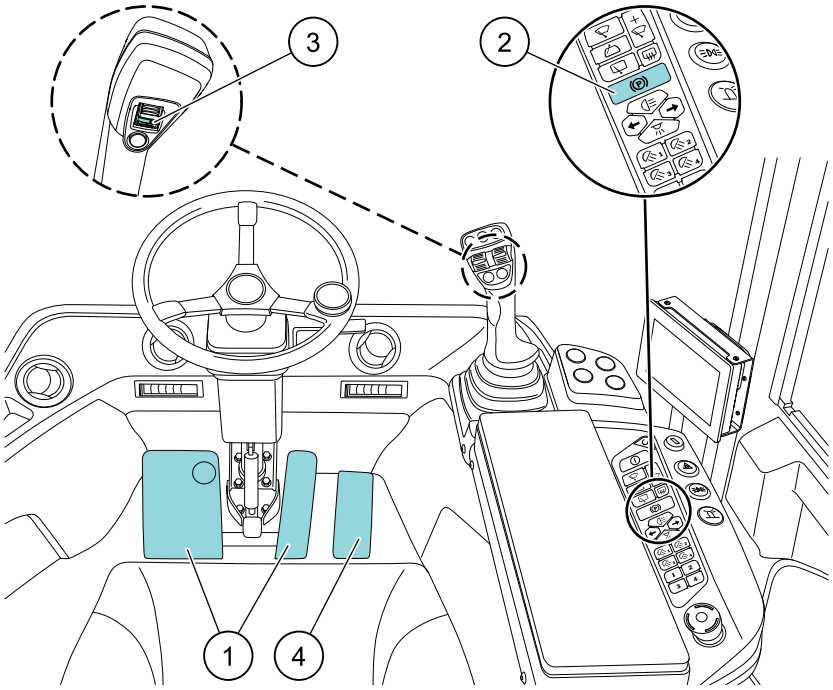

Figure 71. Driving controls, cabin with joystick(option)

1. Press the brake pedal (1).

NOTE ***To avoid damage and prevent the transmission from overheating, always start in the first or second gear.***

2. Release the parking brake (2).
3. Select forward (3).
4. Release the brake pedal (1).
5. Press the accelerator pedal (4) slowly.

NOTE ***When starting uphill, hold the machine still using the brake pedal (4), until you have sufficient pulling power.***

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4.14.9 Stopping the machine

NOTE ***For more information regarding position of the forks when parking, see Parking (page 133).***

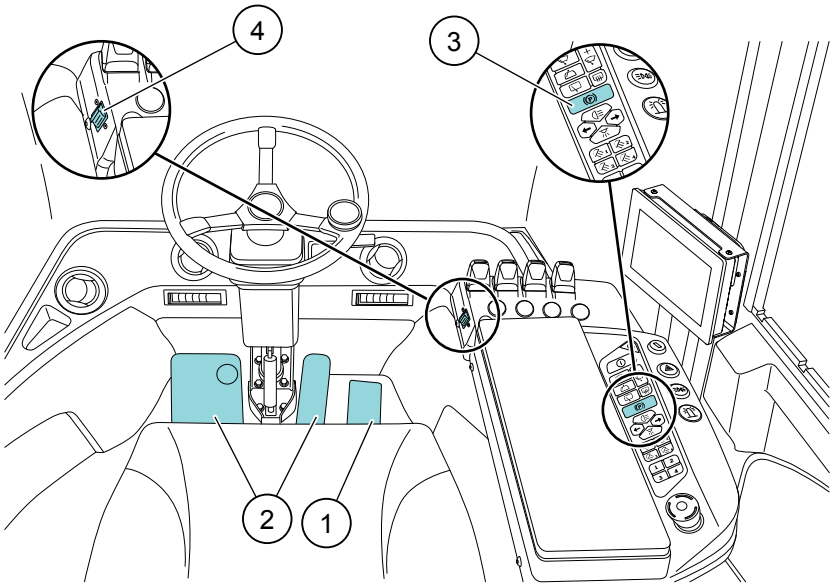

Figure 72. Driving controls, cabin with levers

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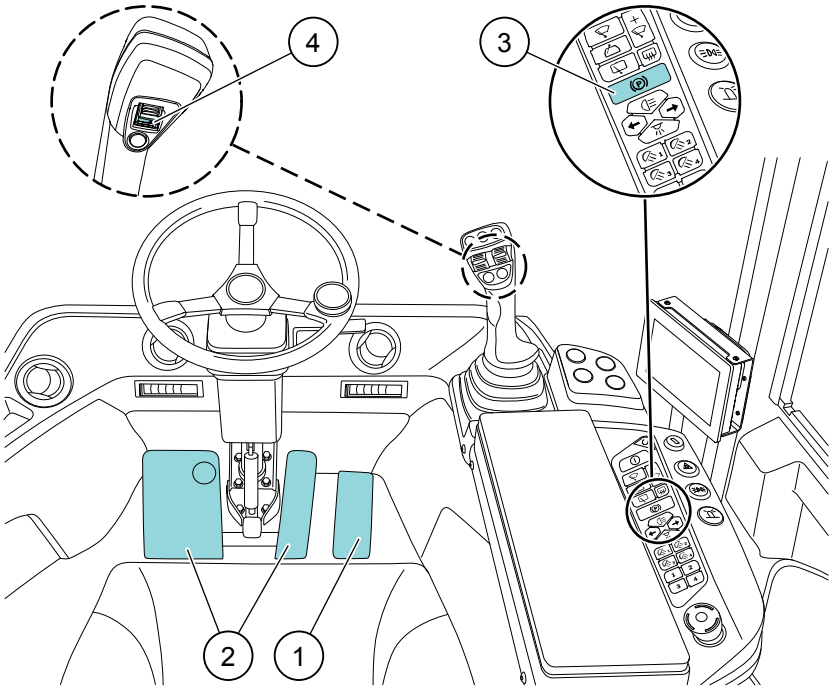

Figure 73. Driving controls, cabin with joystick(option)

1. Take your foot off the accelerator pedal (1).
2. Press the brake pedal (2) and stop the machine in a gentle, controlled manner.

⚠ WARNING

FORWARD TIPPING HAZARD

Sudden braking and acceleration may cause the machine to roll or tip. Risk of serious personal injury and damage to the machine.

Avoid violent acceleration and braking.

NOTICE

RISK OF PROPERTY DAMAGE

Do not use the transmission as a brake.

3. Select the neutral gear (4).
4. When the machine has stopped, activate the parking brake (3) before releasing the brake pedal.

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4.14.10 Driving in reverse

DANGER

MOVING VEHICLE HAZARD

Reversing without a direct view in the reverse direction may cause death, serious personal injury, or damage to property.

Only drive in reverse when you have a direct and unobstructed view in the reverse direction.

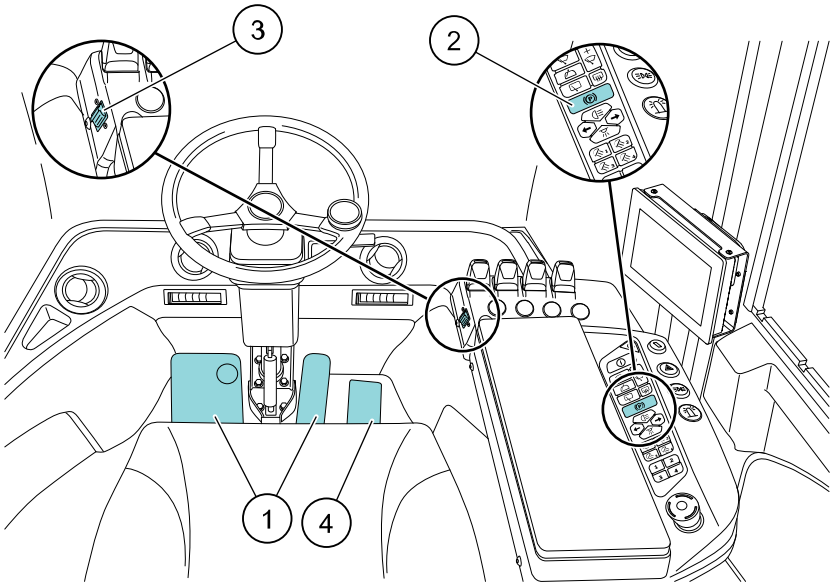

Figure 74. Driving controls, cabin with levers

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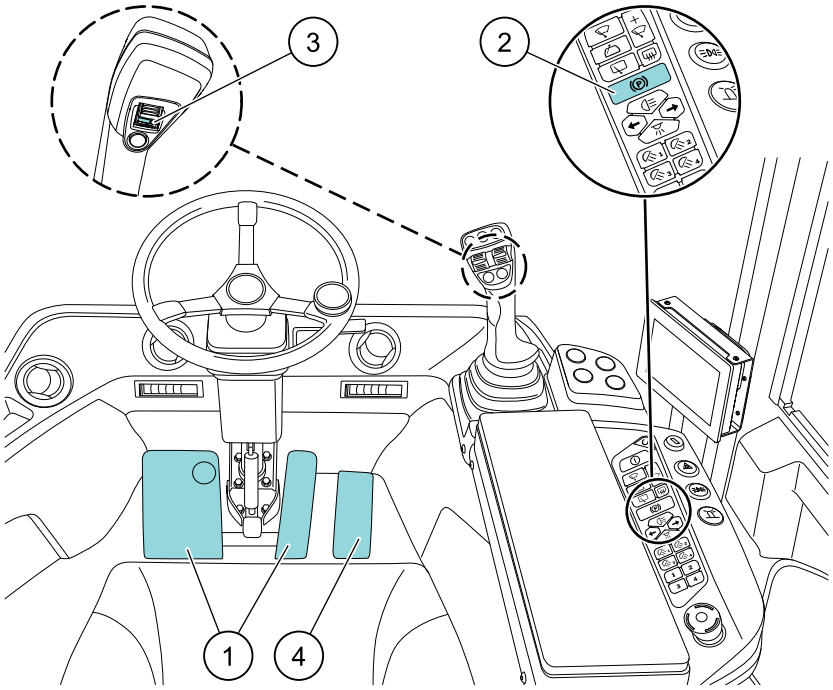

Figure 75. Driving controls, cabin with joystick

1. Press the brake pedal (1).

NOTE ***To avoid damage and prevent the transmission from overheating, always start in the first or second gear.***

2. Release the parking brake (2).
3. Select reverse (3).
4. Release the brake pedal (1).
5. Press the accelerator pedal (4) slowly.

NOTE ***Make sure that there is a direct view in the reverse direction.***

NOTE ***When starting uphill, hold the machine still using the brake pedal (4) until you have sufficient pulling power.***

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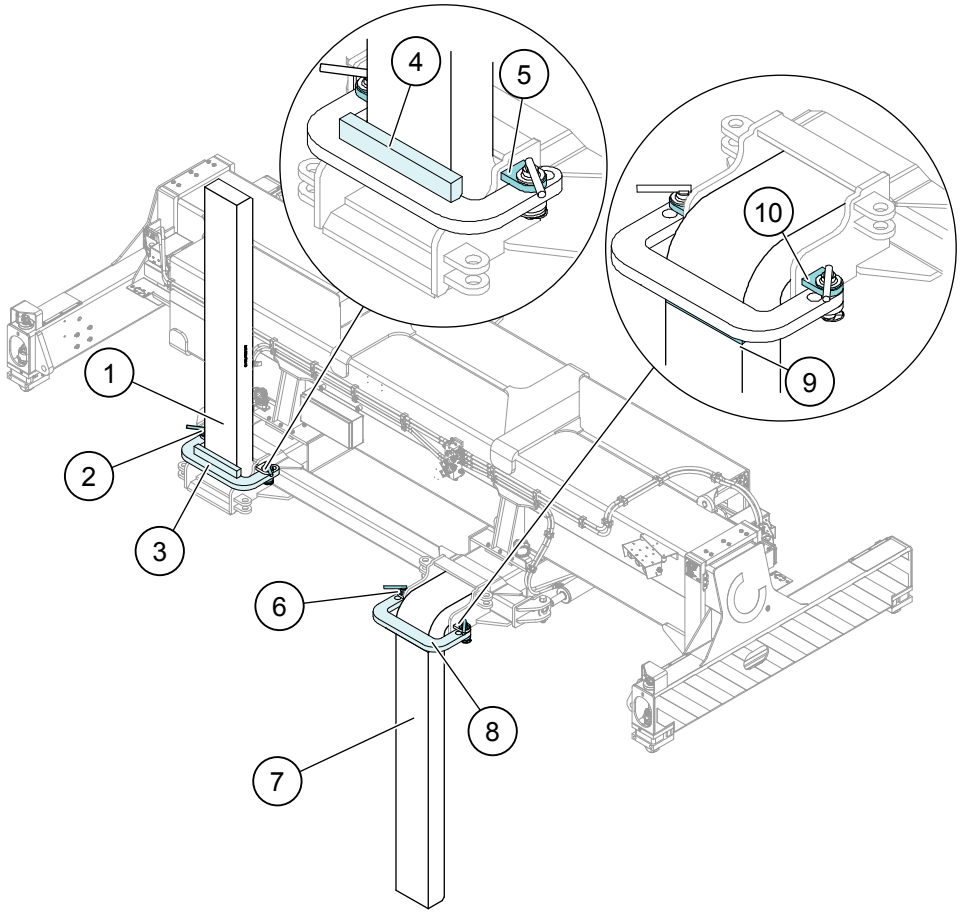
4.15 Mounting the attachment - ELME 815

4.15.1 Parts of the attachment



1. Fork in standard position
2. Fixation for the safety and mounting bracket (std position)
3. Safety and mounting bracket (std position)
4. Safety edge on bracket (std position)
5. Upper fixation point (std position)
6. Fixation for the safety and mounting bracket (inverted position)
7. Fork in inverted position
8. Safety and mounting bracket (inverted position)
9. Safety edge on bracket (inverted position)
10. Lower fixation point (inverted position)

4.15.2 Mounting the attachment - forks in standard position

⚠ WARNING

RISK OF DAMAGE TO THE MACHINE

If the attachment is not fixated correctly on the forks, there is risk of dropping the attachment. Dropping the attachment can damage the machine and the surrounding area.

Make sure to use the upper fixation points and position the mounting brackets with the safety edge upwards.

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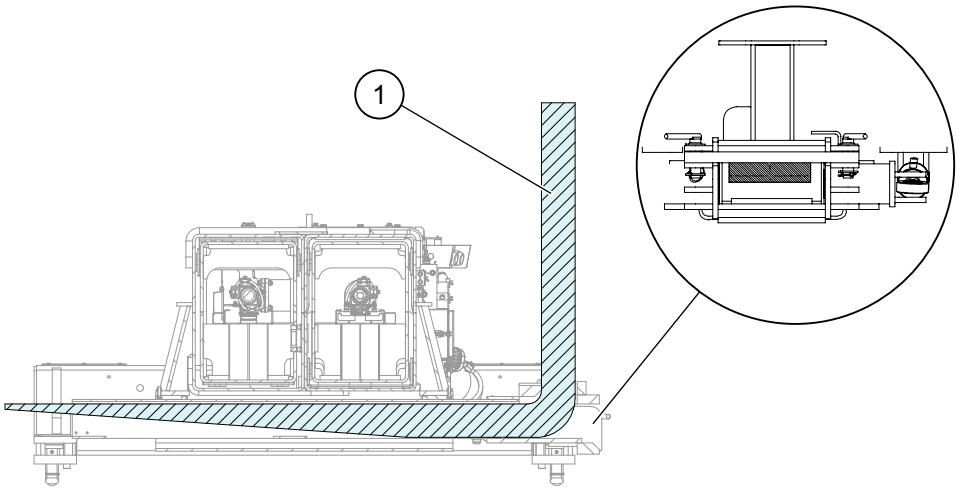
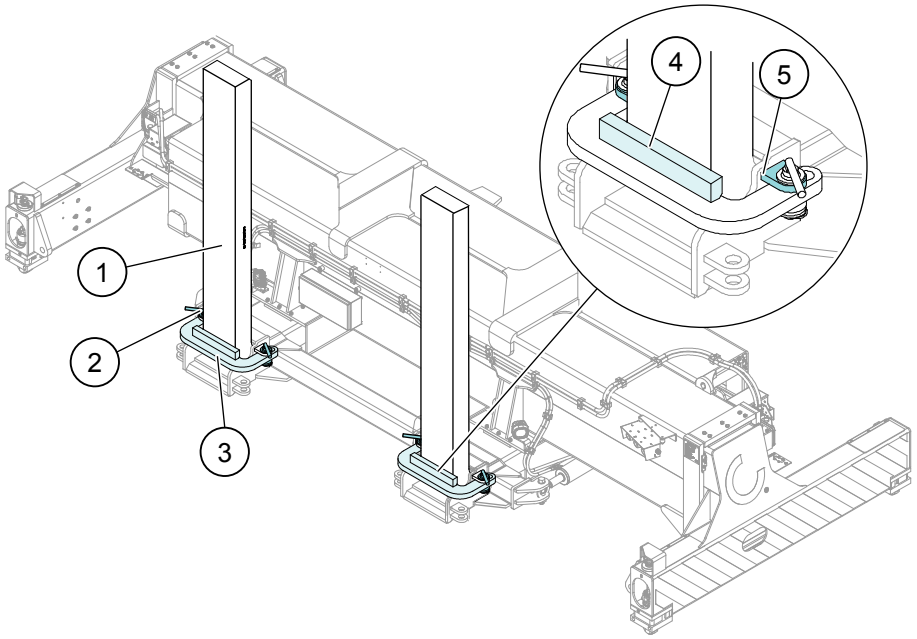


1. Insert the forks (1) in the pockets on the attachment.



2. Secure the forks (1) with the mounting brackets (3).

NOTE ***The safety edge (4) on the mounting brackets (3) must be positioned upwards.***

NOTE ***Use the upper fixation points (5) for the mounting brackets (3) when using forks in standard position (1).***

3. Secure the mounting brackets (3) with the fixations (2).

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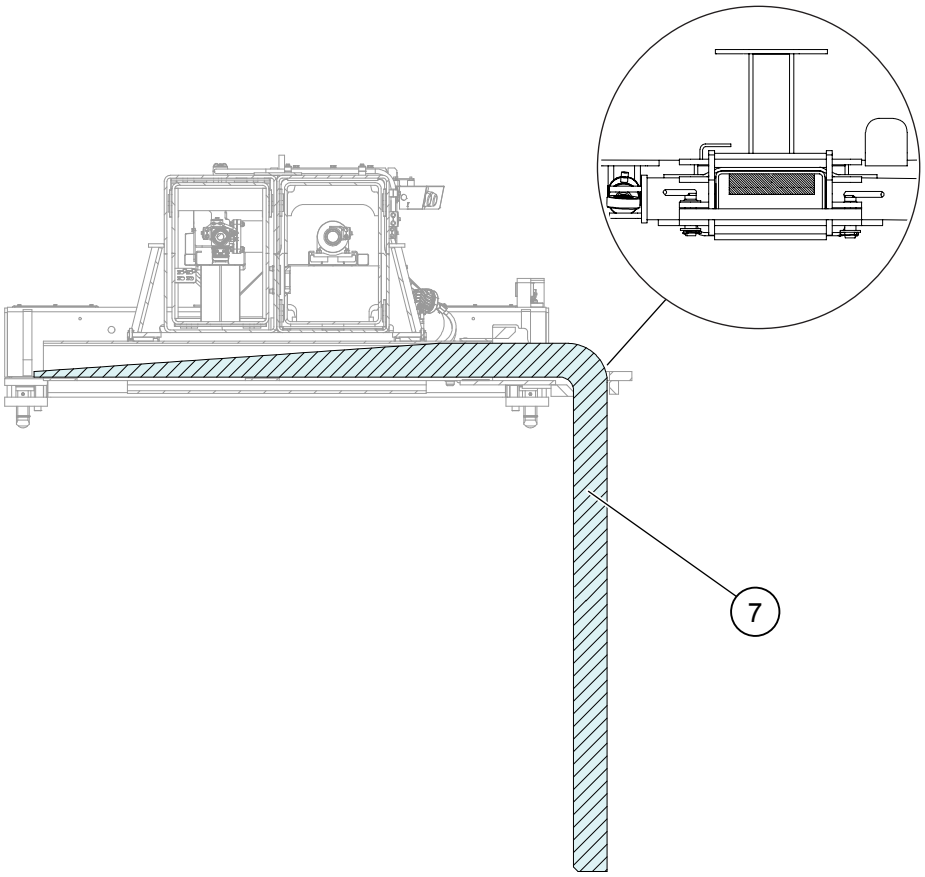
4.15.3 Mounting the attachment - forks in inverted position

⚠ WARNING	
	RISK OF DAMAGE TO THE MACHINE **If the attachment is not fixated correctly on the forks, there is risk of dropping the attachment. Dropping the attachment can damage the machine and the surrounding area.** **Make sure to use the lower fixation points and position the mounting brackets with the safety edge downwards.**



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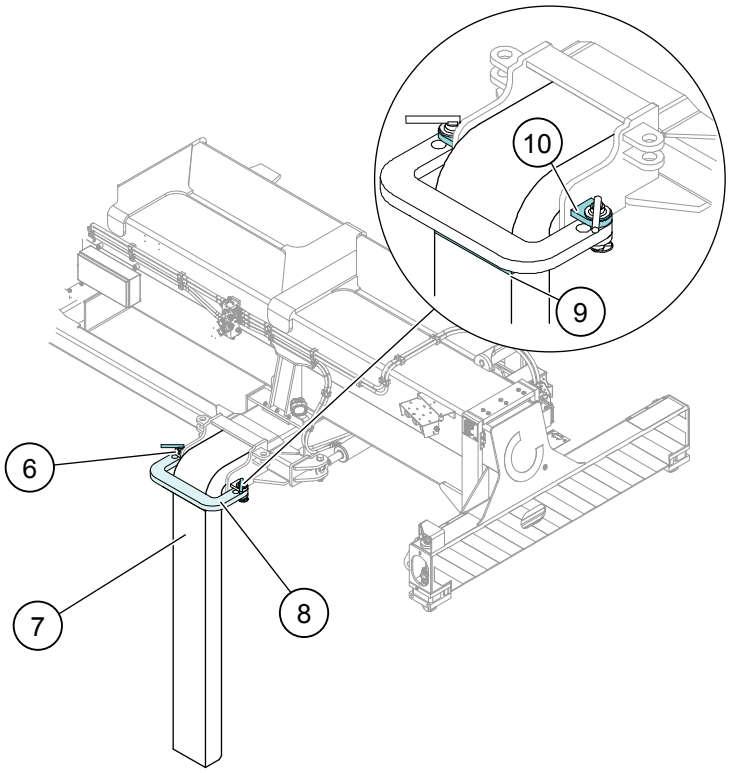
1. Insert the forks (7) in the pockets on the attachment.



2. Secure the forks (7) with the mounting brackets (8).

NOTE ***The safety edge (9) on the mounting brackets (8) must be positioned downwards.***

NOTE ***Use the lower fixation points (10) for the mounting brackets (8) when using forks in inverted position (7).***

3. Secure the mounting brackets (8) with the fixations (6).

4.15.4 Connecting the hydraulic quick couplings

⚠ WARNING

RISK OF MALFUNCTION

The hydraulics may not work properly if the hydraulic hoses are not connected correctly.

Make sure to attach the quick couplings for the hydraulics to the corresponding connections on the carriage.

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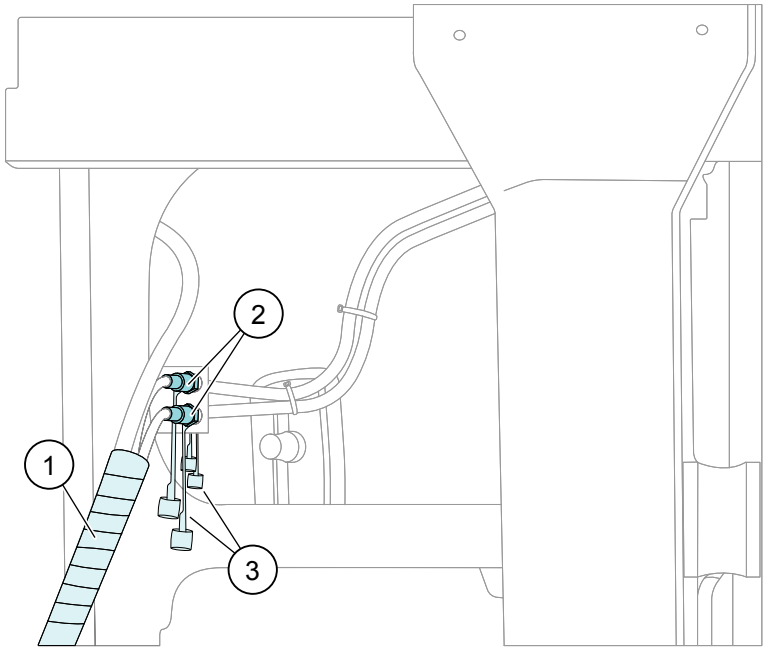

Figure 76. Hydraulic quick couplings - ELME 815

1. Select the hydraulic quick couplings from the hose package (1) on the attachment.
2. Remove the four yellow protection plugs (3) from the quick couplings.
3. Connect the quick couplings (2) for the hydraulics to the corresponding connection on the carriage.

NOTE ***Always reattach the protection plugs (3) when disconnecting the quick couplings.***

4.15.5 Connecting the electric contact

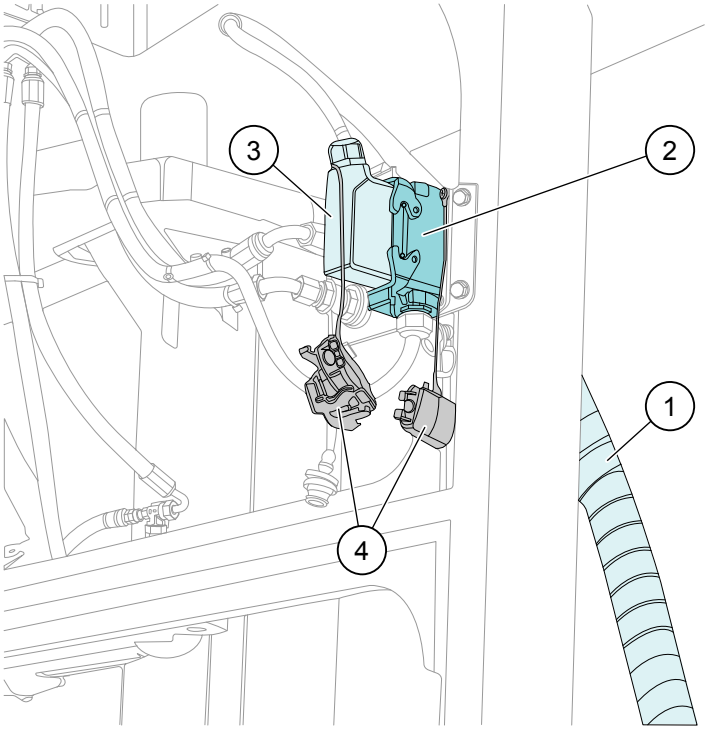

Figure 77. Electric contact - ELME 815

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1. Select the electric contact (3) from the hose package (1).
2. Remove the protection lids (4) from the electric box (2) on the carriage, and from the electric contact (3) on the hose package (1).
3. Connect the electric contact (3) to the electric box (2) on the carriage.

NOTE ***Always reattach the protection lids (4) when disconnecting the electric contact (3) from the electric box (2).***

4.16 Lifting and driving with a load

⚠ DANGER

UNCONTROLLED MOVEMENT HAZARD

If the machine moves unexpectedly, it could result in personal injury, death, or damage to the equipment.

To stop any unexpected movement, push the emergency stop button.

⚠ WARNING

RISK OF TIPPING

If activating the emergency stop when driving, the parking brake is activated. This safety maneuver can cause the load to rapidly slide forwards, and cause imbalance or cause a load drop.

Drive slowly and follow the recommendations for Transporting a load (page 163).

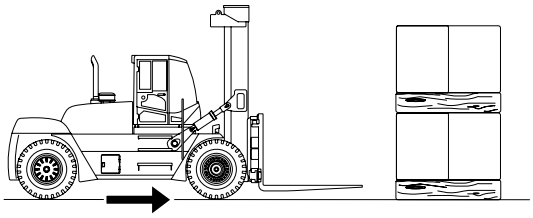
4.16.1 Lifting a load

⚠ DANGER

MOVING VEHICLE HAZARD

Reversing without a direct view in the reverse direction may cause death, serious personal injury, or damage to property.

Only drive in reverse when you have a direct and unobstructed view in the reverse direction.



1. Drive forward towards the load.

If the load is not centered, the operator must take extra precautions to center the load on the forks.

NOTE ***If the operator does not take the precautions that are recommended above, the load can move unexpectedly. Avoiding to take precautions could cause the load to fall or move towards the mast and carriage.***

To center the load also reduces the stress on the lifting equipment.

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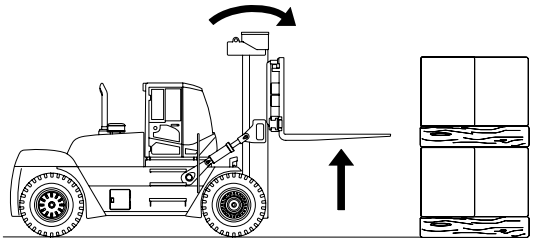
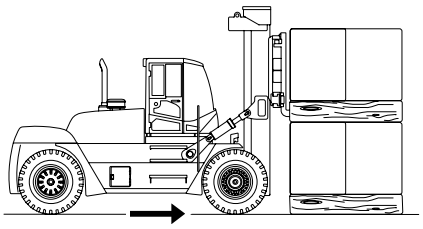
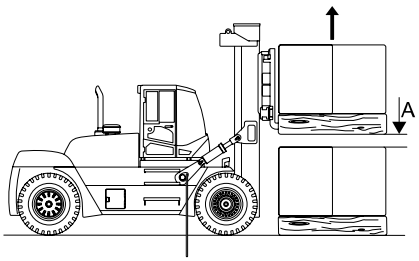


2. Raise or lower the forks to the correct height.
3. Place the mast in its vertical position.

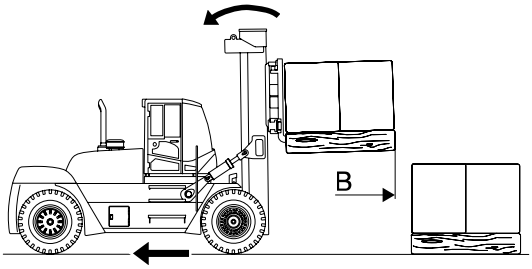


4. Carefully push the forks under the load until the fork shafts touch the load.



5. Raise the forks until the load rests on the forks.
   A = 20–40 cm (8–16 in).

NOTE ***Raise only so much that the load is free from the surface. Check that the weight of the load is centered in regards to the mast and the machine. Sideshift the forks to adjust the weight balance if necessary.***



6. Tilt the mast backwards.
7. Reverse the machine until the load is free from the front of the stack.
   B = 20–40 cm (8–16 in).

NOTE ***Make sure that there is a direct view in the reverse direction.***

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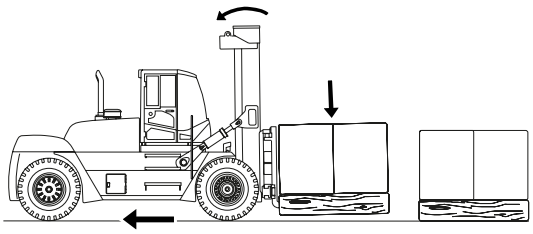

8. Lower the load to the transport position.

NOTE ***Distance between the forks and the ground should be 30 cm (11.8 in) or 50 cm (19.6 in) depending on the size of the machine. See Transporting a load (page 163) for more information.***

4.16.2 Transporting a load

⚠ DANGER

MOVING VEHICLE HAZARD

Reversing without a direct view in the reverse direction may cause death, serious personal injury, or damage to property.

Only drive in reverse when you have a direct and unobstructed view in the reverse direction.

⚠ WARNING

FALLING LOAD HAZARD

Load and attachment may drop and lead to serious personal injury or death.

Do not allow anyone to stand or walk under the elevated part of the machine whether it is empty or loaded. Never park or leave a machine with raised load unsupervised.

⚠ WARNING

COLLISION HAZARD

Driving with the forks or load in the raised position could result in serious personal injury or death.

Never drive with the forks or load in the raised position.

⚠ WARNING

RISK OF LOAD DROP

Driving downhill on slopes carrying a load, can lead to a load drop. This can damage the machine and can lead to serious personal injury.

If carrying a load, always drive downhill in reverse.

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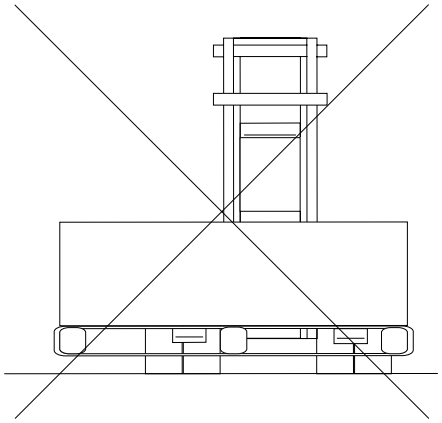
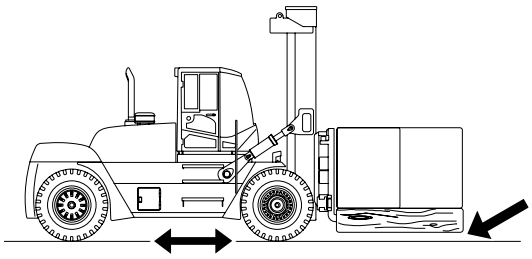


- Do not drive with the load displaced sideways (for example, by side maneuvering).



- Tilt the mast backwards.
- Transport the load close to the ground.

NOTE

In transport position, the distance between the forks and the ground should be:

- ***30 cm (11.8 in) for machines up to 10 T.***
- ***50 cm (19.6 in) for machines larger than 10 T.***
- ***30 cm (11.8 in) when lifting containers with fork pockets (machines up to 10 T).***
- ***50 cm (19.6 in) when lifting containers with fork pockets (machines larger than 10 T).***

NOTE ***When handling containers, using an attachment, the bottom of the lifted container should be at eye height.***

- Avoid driving on slopes or uneven surfaces when transporting a load.
- Always drive with the load turned upwards on a slope. Never drive across, or turn on a slope.
- Never drive with raised forks, or a raised load above the recommendations for transport position.
- If the view is reduced, ask someone to guide you.
- If the load has been stacked so high that it prevents a forward view, drive the machine in reverse.

NOTE ***Make sure that there is a direct view in the reverse direction.***

NOTE ***If the load is transported a longer distance, check the height of the load every now and then.***

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4.16.3 Unloading a load

⚠ DANGER

COLLISION HAZARD

Driving with the forks or load in the raised position could result in serious personal injury or death.

Never drive with the forks or load in the raised position, or with a raised load above 30 cm (11.8 in), or 50 cm (19.6 in) depending on the size of the machine. See Transporting a load (page 163) for more information.

⚠ DANGER

MOVING VEHICLE HAZARD

Reversing without a direct view in the reverse direction may cause death, serious personal injury, or damage to property.

Only drive in reverse when you have a direct and unobstructed view in the reverse direction.

⚠ DANGER

UNCONTROLLED MOVEMENT HAZARD

If the machine moves unexpectedly, it could result in personal injury, death, or damage to the equipment.

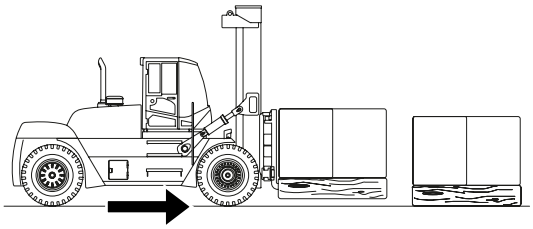
To stop any unexpected movement, push the emergency stop button.

⚠ WARNING

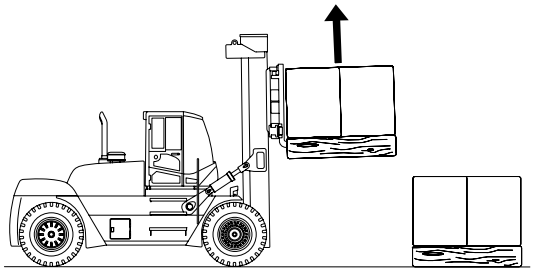
RISK OF TIPPING

If activating the emergency stop when driving, the parking brake is activated. This can cause the load to rapidly slide forwards, and cause imbalance or cause a load drop.

Drive slowly and follow the recommendations for Transporting a load (page 163).



1. Drive up to the stack or unit on which you want to unload as precisely as possible.



2. Raise the fork carriage to the correct height.

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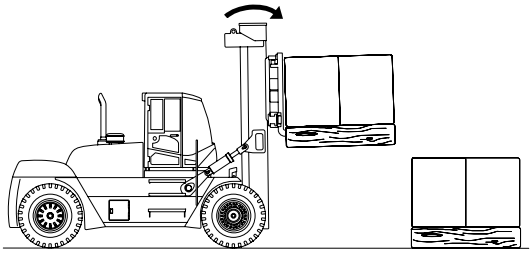
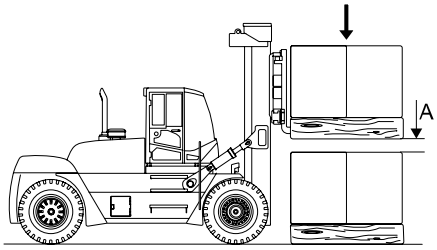
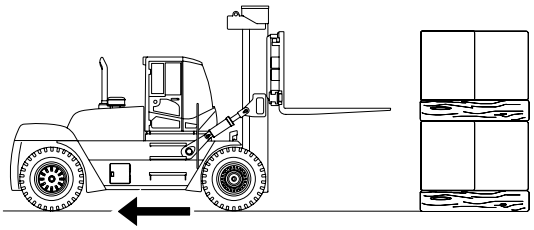


3. Place the load vertically.
4. Carefully drive up to the stack.



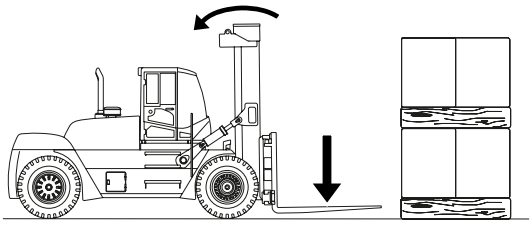
5. Lower the load. To avoid scratching the load (depending on the weight of the load), tilt slightly forward. The mast and forks should be vertical and horizontal before reversing from the stack.



6. Carefully reverse from the stack. Ensure that the forks are free.

NOTE ***Make sure that there is a direct view in the reverse direction.***

7. Lower the forks to the transport position. Tilt the mast backwards.



NOTE ***Distance between the forks and the ground should be 30 cm (11.8 in) or 50 cm (19.6 in) depending on the size of the machine. See Transporting a load (page 163) for more information.***

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4.17 Emergency lowering, general

DANGER

FALLING LOAD HAZARD

Danger of serious personal injury, death, or damage to the vehicle. The mast and carriage descend fast, about 1 m/s.

Ensure that the carriage and the mast can be lowered without hindrance.

Ensure that there are no people or items underneath or near the forks.

Emergency lowering must be performed by trained service personnel.

DANGER

FALLING LOAD HAZARD

Danger of serious personal injury, death, or damage to the vehicle. If the locking screw and the locking nuts are repositioned wrongly, the mast and carriage can descend unexpectedly during operation.

Ensure that the locking screw is returned to the exact same position when restored. This task must be performed by trained service personnel.

The machine is equipped with hydraulic assistance. If the engine stops or if a fault occurs in the hydraulics preventing the assistance from working, you cannot lower using the maneuvering levers.

The directional control valve is therefore equipped with a mechanical control that allows manual lowering.

4.17.1 Emergency lowering for SMV 10-16 - L90 main valve

NOTE ***The emergency lowering locknut is located behind the hoses.***

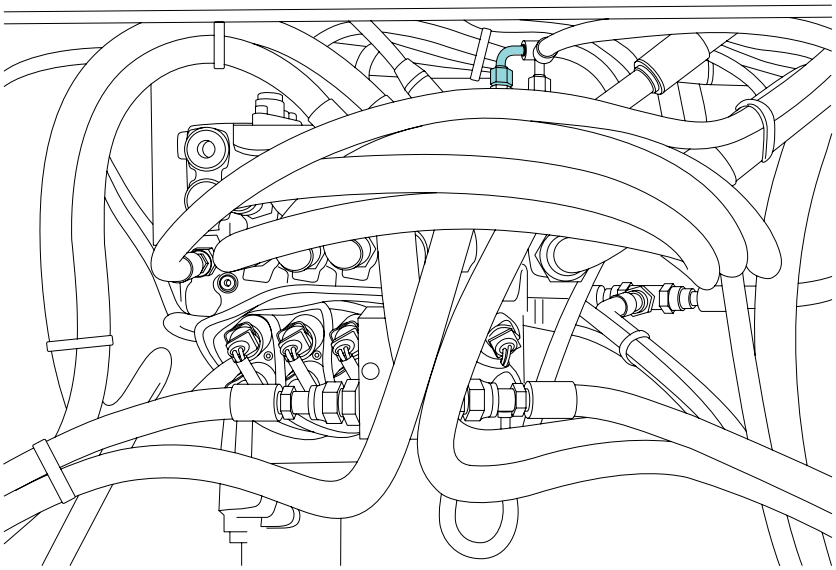

Figure 78. L90 view from above (look for the 90-degree hydraulic coupling placed horizontally)

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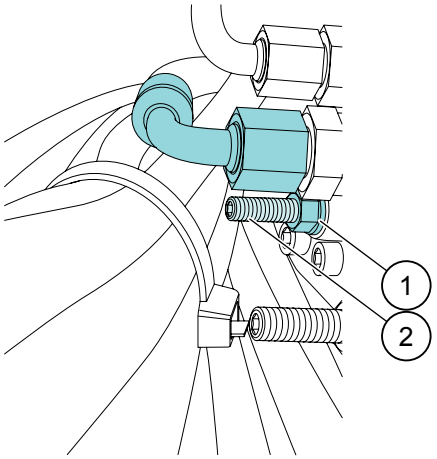

Figure 79. L90 view from side, left side, behind

NOTE ***The locking screw (2) is the one nearest to the 90-degree hydraulic coupling.***

1. Tilt the cabin upwards.
2. Loosen the locknut (1).
3. Open the locking screw (2) with an Allen wrench.

NOTE ***The mast and carriage descends rapidly.***

When the mast has been lowered, it is not possible to raise it again until the engine runs and the hydraulics works correctly.

NOTE ***Always count the turns when loosening the locknut (1) and locking screw (2). Always reset the locknut (1) and locking screw (2) to their original position, after emergency lowering is performed.***

4.17.2 Emergency lowering for SMV 18-60 - K220/L90 main valve

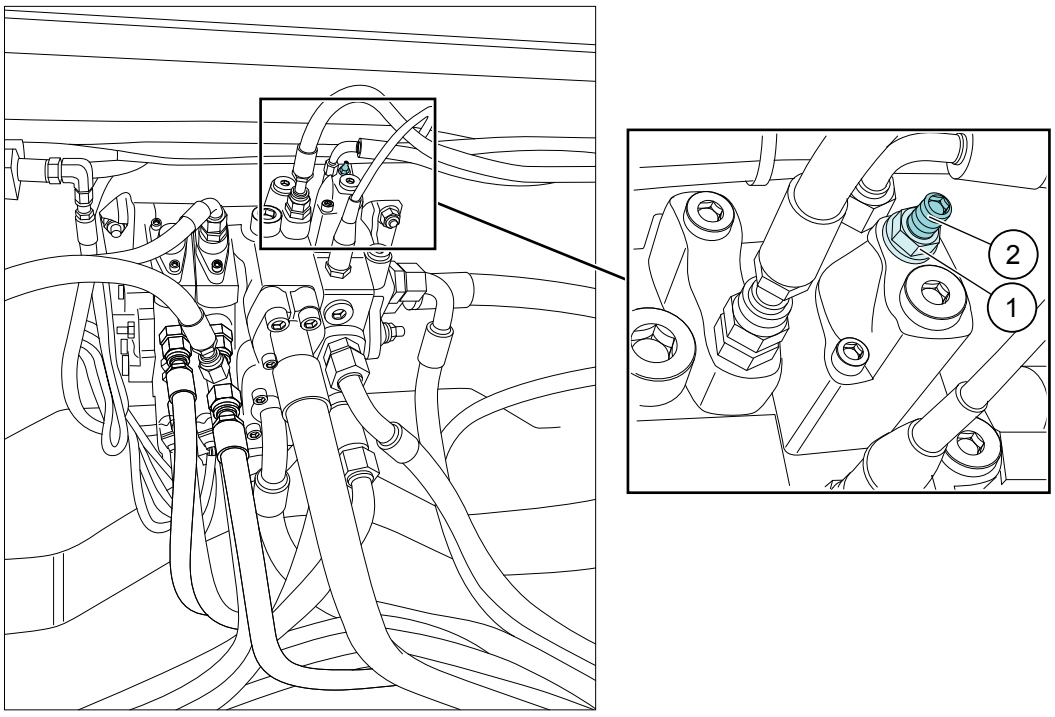

Figure 80. K220/L90 main valve

1. Tilt the cabin upwards.

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2. Loosen the locknut (1).
3. Open the locking screw (2) with an Allen wrench.

NOTE ***The mast and carriage descends rapidly.***

When the mast has been lowered, it is not possible to raise it again until the engine runs and the hydraulics works correctly.

NOTE ***Always reset the locknut (1) and locking screw (2) to their original position, after emergency lowering is performed.***

4.18 Towing

⚠ WARNING

RUN OVER HAZARD

If the engine, the electrical system or the hydraulic system is broken, the parking brake may need to be released manually to tow the machine. In this situation, the machine has no brakes or steering capability, which may lead to serious personal injury and damage to the machine.

When towing the machine, the engine must idle, or a vehicle with sufficient braking capacity to stop both vehicles must be used.

⚠ WARNING

MOVING VEHICLE HAZARD

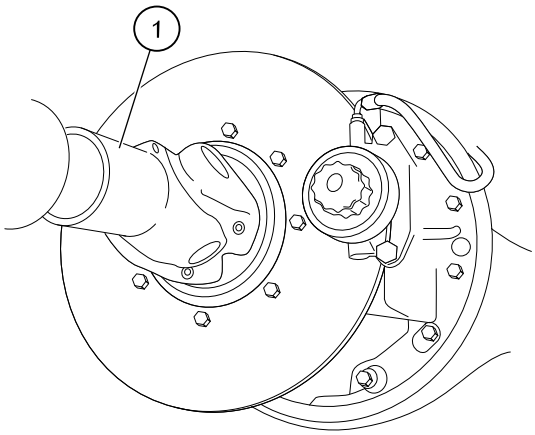
When towing the machine, there is a risk that the machine becomes unattached from the towing vehicle. It can lead to serious personal injury and damage to the machine.

Do not exceed the towing capacity of the transporting vehicle.

NOTE ***Only trained and authorized personnel are allowed to tow the machine.***

If possible, the engine should idle when being towed. If not, the hydraulic brake system, and servo-assisted steering system cannot be used.

If idling is not possible, release the hydraulic parking brake manually. After the hydraulic parking brake is released, the machine has no brakes. To stop both vehicles when towing the machine, use a vehicle with sufficient brake capacity. Use a towing bar if possible.



1. Attach the towing bar to the machine.

NOTE ***Use the rear towing peg, if applicable, when fitting a sturdy towing bar on the machine. Otherwise use slings and secure them around the back counterweight when towing.***

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2. Remove the propshaft (1).
3. Release the parking brake manually.

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APPENDIX I: FUEL AND OIL RECOMMENDATIONS

Quality of the engine oil

Depending on engine type, the engine oil must comply with one of the following oil classifications:

- Volvo VDS-4.5
- Volvo VDS-4
- Volvo VDS-3
- CES20081 / ACEA E9 / API CJ-4
- CES20071 / ACEA E5 / API CH-4
- ACEA E5 / API CI-4

Table 9. Oil classifications according to engine type

Engine	Oils					
	VDS-4.5	VDS-4	VDS-3	CES20081 / ACEA E9 / API CJ-4	CES20071 / ACEA E5 / API CH-4	ACEA E5 / API CI-4
Volvo TAD 581, 881, 883, 1181 VE	X					
Volvo TAD 571, 871, 873, 1171, 1371 VE		X				
Volvo TAD 541, 551, 841, 851, 853, 1141, 1151 VE			X			
Cummins QSB 6.7 T4, B 6.7, X12 1)				X		
Cummins QSB 6.7, QSM 11					X	

1) For Cummins B 6.7 and X12 engines, SAE 15W-40 must be used.

Check with your oil supplier that your oil meets these demands.

For engines that do not use fuel with low sulphur content, the TBN (Total Base Number) value should be at least 12 according to ASTM 2896. Check with your oil supplier that your oil meets these demands.

Depending on operating conditions, and the quality of the oil and fuel, the intervals between changing the oil may vary in length.

The engine oil must be replaced within a maximum operation time of one year.

If the machine is parked in cold weather, the viscosity of the oil can vary according to the temperature. Therefore the ambient temperature is vital to the choice of the engine oil viscosity range (see following figure).

NOTE ***If the machine is warm, the oil is also warm.***

Changing the oil due to a change in season may be avoided by using multi-grade oils. Specified intervals for changing the oil also apply to multi-grade oils.

NOTE ***No oil additives should be added to the recommended oils. Using such additives may invalidate the engine warranty.***

Avoid mixing different brands of oil.

The temperature ranges for adjacent SAE classes overlap, so you do not need to replace the oil when short-term temperature changes occur.

NOTE ***To ensure trouble-free cold starts, select the SAE class according to the ambient temperature.***

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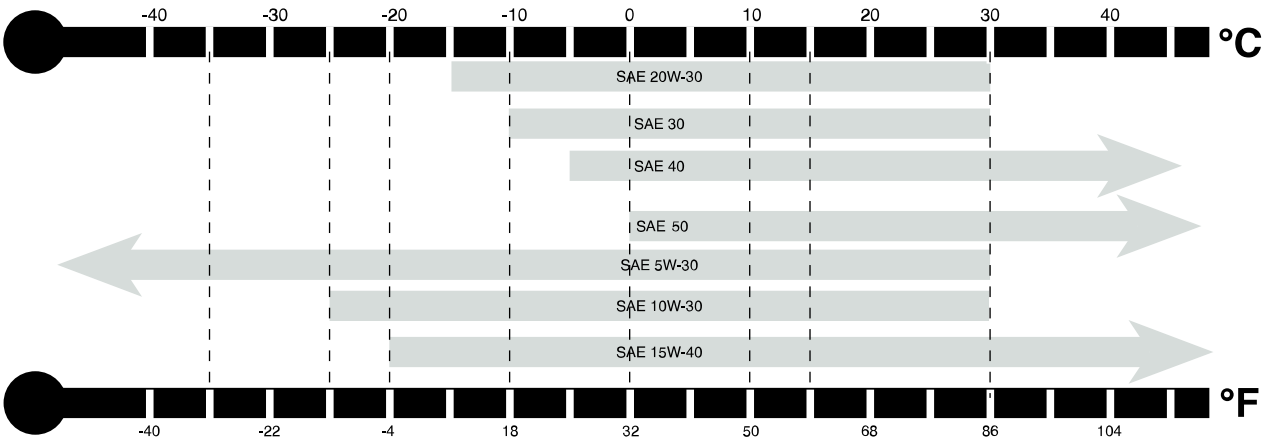

Figure 81. Oil temperature ranges

Extended oil change interval

Extended oil change interval may differ when using synthetic fluids. To determine a baseline, appropriate change intervals should be determined for each engine by measuring oil oxidation and wear metals over time. Wear metals analysis can provide useful information, but an engine should not be removed from service based solely on this analysis. For more information contact Konecranes Lift Trucks, an authorized dealer, or the engine supplier.

Recommended fluids and lubricants

Diesel fuel

It is recommended to use diesel fuel **HVO 100**, which complies with the following classification:

- EN 15940 Class A

If using other diesel fuels than **HVO 100**, they must comply with one of the following classifications:

- EN 590
- ASTM D 975 No 1-D or 2-D

For Tier 4F, stage 4 and stage 5 engines **ULSD** (**Ultra-Low Sulfur Diesel**) fuel must be used (sulphur content below 15 mg/kg).

For more information, contact the engine manufacturer, or an authorized representative.

NOTE ***As the ambient temperature falls, the flow characteristics of the diesel fuel are reduced and paraffin begins to precipitate, i.e the diesel is gelling in cold temperatures. Use the correct diesel quality according to the ambient temperature.***

NOTE ***Using additives to improve the flow is not recommended. Additives may reduce the capacity to start from cold.***

Biodiesel (FAME)

Vegetable oil esters (Fatty Acid Methyl Esters, FAME), also called "biodiesel", are increasingly available as a blending component in diesel fuels.

The engine manufacturer accepts the same FAME content as in major on-road fuels EN590 and ASTM D975. The maximum FAME content is 7%, without any specific extra service requirements. For more information, contact the engine manufacturer, or an authorized representative.

NOTE ***Higher FAME blends negatively impact performance, emissions, and fuel consumption. It also affects negatively the function of the SCR engines exhaust after treatment system.***

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AdBlue solution

Only use an AdBlue solution that fulfills the ISO 22241 standard. The AdBlue solution consists of deionized water that is mixed with 32.5% urea.

Table 10. Engines using AdBlue solution

Engine family	Engine
VOLVO	TAD 571 VE
	TAD 871 / 873 VE
	TAD 1171 VE
	TAD 1371 VE
	TAD 581 VE
	TAD 881 / 883 VE
	TAD 1181 VE
CUMMINS	QSB 6.7 [1] / B 6.7 / X12

1) EU stage 4 / US tier 4f

Transmission oil

DANA transmission: ATF Dexron III

ZF transmission: Mineral oil -based engine oil (API CD/CE/CF-4/CF/CG-4/CH-4/CI-4/SF/SG/SH/SJ/SL or ACEA, categories A, B, E). Viscosity degrees: SAE 20W-20 / 30 / 10W-30 / 10W-40 / 15W-30 / 15W-40 / 20W-40. For more information, see the ZF recommended oil list TE-ML 03.

Table 11. ZF Transmission: Approved and recommended oil types

Lubricant class	Oil type / viscosity	Temperature
03C, 03M	ATF (Automatic transmission fluids)	-40°C
03F	UTTO in accordance with JDM 20D / John Deere Low Viscosity Hy-Gard	-40°C
03E, 03G, 03H	UTTO	-30°C
03K	SAE 0W-30, 0W-40	-40°C
03B, 03C, 03K	SAE 5W-30, 5W-40	-35°C
03A, 03B, 03C, 03K	SAE 10 W, 10W-30, 10W-40	-30°C
03A, 03C, 03K	SAE 15W-30, 15W-40	-25°C
03A, 03C, 03K	SAE 20W-20, 20W-40	-20°C
03A, 03C, 03K	SAE 30	-10°C

Oil change interval

Drain and refill the system every 1000 h for average environmental and duty cycle conditions. Severe or sustained high operating temperature or dusty environments cause accelerated deterioration or contamination. Judgment must be used to determine the required change intervals for extreme conditions. For more information, contact your local authorized dealer.

Drive axle oil

Axle housing / Hub assembly / Drive Assembly

API GL.5 SAE 90

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Table 12. Oil filling quantities

Model	Drive axle	Width (mm)	Planetary gear	Brake	Differential	Hub
FLT 10-16	D81	2274	PL478	NLB5340	19 l (5.02 US gal)	2.3 l (0.6 US gal)
FLT 18-25	D91	2717	PL488	NLB4460	31 l (8.2 US gal)	3.2 l (0.8 US gal)
FLT 28-33	D91	3015	PL408	NLB6460	36.5 l (9.6 US gal)	3.7 l (0.97 US gal)
FLT / LCH 37-50	D102	3807	PL341	NLB8460	72 l (19 US gal)	11 l (2.9 US gal)
FLT / LCH 37-50	D102	3431	PL341	NLB8460	58 l (15.3 US gal)	11 l (2.9 US gal)
LCH 52	D102	4549	PL341	NLB8460	121 l (31.9 US gal)	12.5 l (3.3 US gal)
FLT / LCH 52-55	D106	3807	PL341	NLB8460	85 l (22.4 US gal)	11 l (2.9 US gal)
FLT 60-55	D111	4188	PL545	NLB6650-1	108 l (28.5 US gal)	12.5 l (3.3 US gal)
ECH 80	D81	3218	PL478	NLB5340	39 l 10.3 US gal)	2.3 l (0.6 US gal)
ECH 90/100	D81	3713	PL488	NLB6340	45 l (11.9 US gal)	3.5 l (0.9 US gal)
ECH 90/100	D91	4218	PL488	NLB6340	45 l (11.9 US gal)	3.5 l (0.9 US gal)
ECH 90/100 *)	D91	4203	PL489	NLB4460	66 l (17.4 US gal)	3.2 l (0.8 US gal)
RST 108	D81	3713	PL488	NLB6340	45 l (11.9 US gal)	3.5 l (0.9 US gal)
RST 2518	D91	3015	PL408	NLB6460	36.5 l (9.6 US gal)	3.7 l (0.97 US gal)
RST 4127-4638	D102	3807	PL341	NLB8460	72 l (19 US gal)	11 l (2.9 US gal)
RST 4537-4644	D106	3807	PL341	NLB8460	85 l (22.4 US gal)	11 l (2.9 US gal)
RST 4646	D111	4188	PL545	NLB6650-1	108 l (28.5 US gal)	12.5 l (3.3 US gal)

*) = with clamped wheel rims

NOTE ***The volumes are strictly recommendations. If you have any doubts, contact your Konecranes Lift Trucks authorized dealer for advice.***

Hydraulic oil

For machines without separate brake cooling tank

Universal Tractor transmission oil (UTTO)

The oil must comply with one of the following classifications:

- John Deere: JD20C
- Massey Ferguson: MF1141/MF1135/ MF1143
- ZF: TE-ML 03E/TE-ML 05F/TE-ML 06K

For machines with separate brake cooling tank (option)

DIN 51524 Part 2 HLP and Part 3 HVLP

Use hydraulic oil from a well-known oil company for mobile applications.

Viscosity	Temperature range
SHS 32	-30°C...+10°C (-22°F...+50°F)
SHS 46	-20°C...+50°C (-4°F...+122°F)
SHS 68	±0°C...+50°C (+32°F...+122°F)

Brake cooling oil (option)

Universal Tractor transmission oil (UTTO)

The oil must comply with one of the following classifications:

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- John Deere: JD20C
- Massey Ferguson: MF1141/MF1135/ MF1143
- ZF: TE-ML 03E/TE-ML 05F/TE-ML 06K

Grease

Multipurpose type E.P. according to NLGI Grade 2.

Coolant

⚠ WARNING

HARMFUL SUBSTANCE HAZARD

Using wrong coolant may damage the machine.

Use the recommended coolant and never mix different coolants.

⚠ WARNING

TOXIC SUBSTANCE HAZARD

It is highly dangerous to drink ethylene glycol. Contact with skin or spray from the refill can cause skin irritation and eye damage.

Do not drink ethylene glycol and avoid contact with skin.

Use only ethylene glycol-based coolants with an additive that prevents corrosion. Do not mix different coolant types with each other. Do not mix the coolant with antifreeze that contains ethanolamine.

Table 13. Coolants for Volvo engines

Engine	Coolant
VOLVO TAD 541, 551 VE	Volvo Penta Coolant VCS-2 and VCS-2 Ready Mixed
VOLVO TAD 571 VE	
VOLVO TAD 581 VE	
VOLVO TAD 841 VE	
VOLVO TAD 851 VE	
VOLVO TAD 871, 873 VE	
VOLVO TAD 881, 883 VE	
VOLVO TAD 1141, 1151 VE	
VOLVO TAD 1171 VE	
VOLVO TAD 1181 VE	
VOLVO TAD 1371 VE	

Table 14. Coolants for Cummins engines

Engine	Coolant
CUMMINS QSB 6.7-C240	To comply with Cummins CES 14603 Recommended: Cummins ES Compleat EG
CUMMINS B 6.7	
CUMMINS QSM 11-C335	
CUMMINS X12	

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Liquid antifreeze at the lowest temperature	Percentage of volume mixture liquid antifreeze	Mixture of antifreeze and water
-12°C (10.4°F)	25	1:3
-18°C (-0.4°F)	30	1:2
-25°C (-13°F)	40	1:1.5
-37°C (-34.6°F)	50	1:1
-60°C (-76°F)	66	2:1

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APPENDIX II: FUSES AND RELAYS

Fuses

Fuses are located behind the operator's seat in the cabin and in the battery compartment on the right side of the machine.

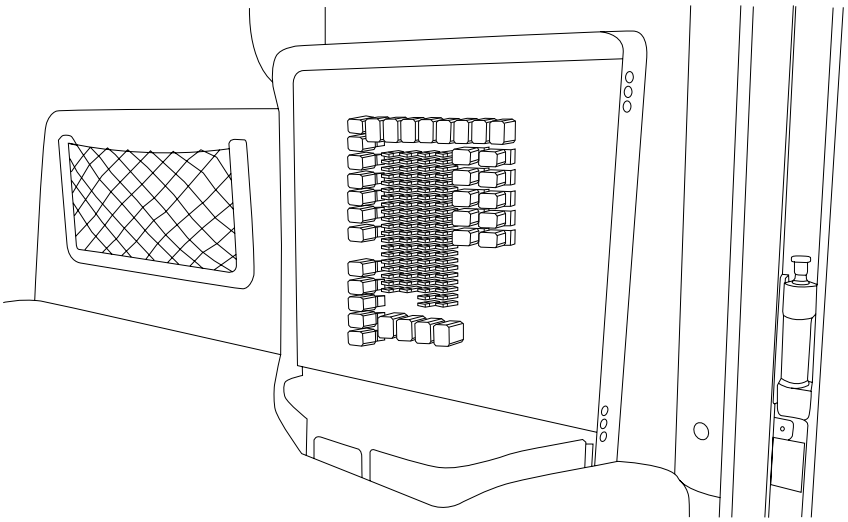

Figure 82. Location of fuses

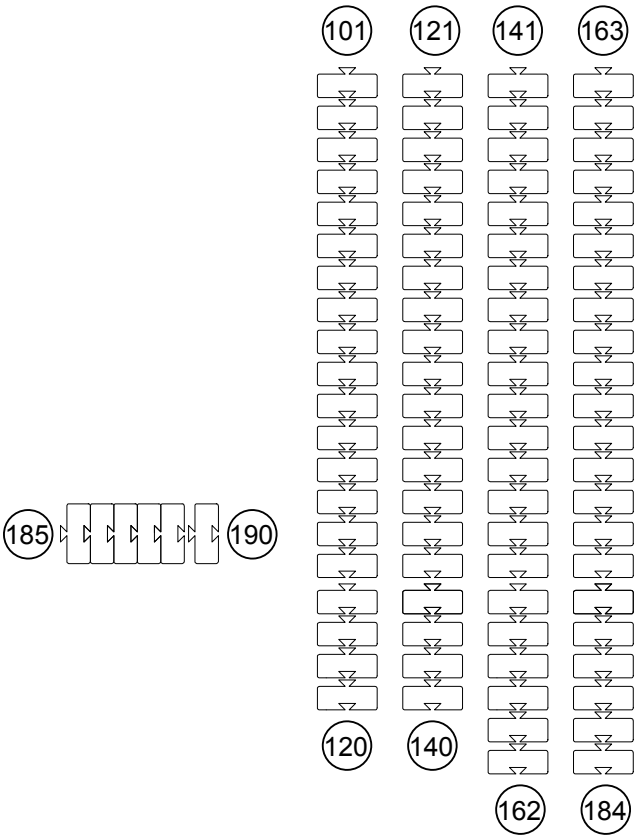

Figure 83. Numbering order of the fuses

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Table 15. Fuses and their function (Functions may vary depending on machine model and chosen options)

Number	Size	Function
F101	7.5 A	Cabin heating
F102	7.5 A	Option
F103	7.5 A	Option
F104	7.5 A	Central lubr. pump chassis
F105	10 A	Converter 12-V option
F106	7.5 A	Reverse light
F107	7.5 A	Working light extra 2
F108	7.5 A	PCB 48-PIN STD D
F109	7.5 A	PCB 48-PIN STD D
F110	7.5 A	PCB 48-PIN STD D
F111	7.5 A	PCB 48-PIN STD D
F112	7.5 A	Clutch for HVAC compressor
F113	5 A	Position light right
F114	5 A	Position light left
F115	7.5 A	High beam
F116	7.5 A	Low beam
F117	15 A	Seat suspension air compressor
F118	7.5 A	Reverse alarm in the front
F119	7.5 A	Working lights extra 1
F120	10 A	Option
F121	7.5 A	Working light mast, right
F122	7.5 A	Working light mast, left
F123	10 A	Main fuse for the lights, F115 and F116
F124	5 A	ACR RFID keyless ignition
F125	5 A	Battery clock (RTC)
F126	7.5 A	Ignition
F127	7.5 A	Beacon
F128	7.5 A	Power supply controller
F129	7.5 A	Hazard
F130	10 A	HV/AC condensor blower 1
F131	10 A	HV/AC condensor blower 2
F132	10 A	HV/AC condensor blower 3
F133	7.5 A	K128 Door open switch
F134	5 A	Reading light
F135	15 A	Rear window heating
F136	7.5 A	RCU
F137	7.5 A	Diagnostic, PCB connector
F138	7.5 A	CAN extra, PCB connector
F139	5 A	Turn signal
F140	7.5 A	PCB 48-PIN STD D
F141	7.5 A	PCB 48-PIN STD D
F142	7.5 A	Rearview mirror heater
F143	5 A	I/O units in the armrest, XC21, XC21 OPT C1, XC21 OPT C2
F144	7.5 A	Seat heater
F145	7.5 A	MD4

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Table 15. Fuses and their function (Functions may vary depending on machine model and chosen options) (Continued)

Number	Size	Function
F146	5 A	TRUCONNECT® modem
F147	5 A	RFID nearguard 2
F148	5 A	Tire pressure gateway
F149	10 A	Connection for computer
F150	5 A	RFID nearguard 1
F151	7.5 A	Main fuse for position light (F113, F114) and brake lights
F152	5 A	Alcohol ignition interlock
F153	10 A	24 V dashboard
F154	5 A	GSM G2 modem
F155	10 A	12 V reverse camera
F156	10 A	12 V dashboard
F157	10 A	24 V roof
F158	7.5 A	Converter roof
F159	10 A	12 V roof
F160	7.5 A	12 V radio
F161	15 A	Working light roof (option)
F162	15 A	Working light roof (option)
F163	10 A	Wiper rear/roof/front washer
F164	7.5 A	PCB 48-PIN STD E
F165	7.5 A	PCB 48-PIN STD E
F166	7.5 A	Converter
F167	7.5 A	Converter 2 rear wall
F168	15 A	Horn
F169	7.5 A	PCB 48-PIN STD E
F170	7.5 A	PCB 48-PIN STD E
F171	7.5 A	PCB 48-PIN STD E
F172	7.5 A	PCB 48-PIN STD E
F173	7.5 A	Fuel heater
F174	7.5 A	Option
F175	7.5 A	Option
F176	15 A	Electrical seat column
F177	7.5 A	Option
F178	7.5 A	Particle detecting monitor (PDM)
F179	10 A	XA2 OPT, external expansion unit in the chassis
F180	10 A	XA2-STD, external expansion unit in the chassis
F181	10 A	Connection for computer
F182	7.5 A	Reverse camera
F183	5 A	HVAC controller
F184	15 A	HVAC blower
F185	3 A	Spare fuse
F186	5 A	Spare fuse
F187	7.5 A	Spare fuse
F188	10 A	Spare fuse
F189	15 A	Spare fuse
F190	-	Fuse test

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Fuses and relays in the battery compartment

DANGER

EXPLOSION HAZARD

Short-circuiting the battery may cause a fire or explosion, which can cause a risk for serious injury or death.

DANGER

CORROSIVE SUBSTANCE HAZARD

The battery contains corrosive acid that may cause a risk for serious injury or death.

Always use the necessary protective equipment.

DANGER

EXPLOSION HAZARD

Batteries generate explosive hydrogen when charged, or when being jump-started, which may cause a risk for serious injury or death.

Always use the necessary protective equipment. Ensure that there is good ventilation and avoid sparking.

WARNING

ELECTRICAL HAZARD

The battery main switch disconnect does not cut the power to the alternator.

To reduce the risks of electric shock and personal injury always remove jewelry and conductive material before working on the electrical system. Always disconnect the ground (minus) cable at the battery when working near or on the alternator.

WARNING

TIPPING OVER HAZARD

Turning off the battery main switch while the machine is moving applies the parking brake and the machine may tip over. The software in the control unit can get damaged.

Do not turn it off while the engine is running.

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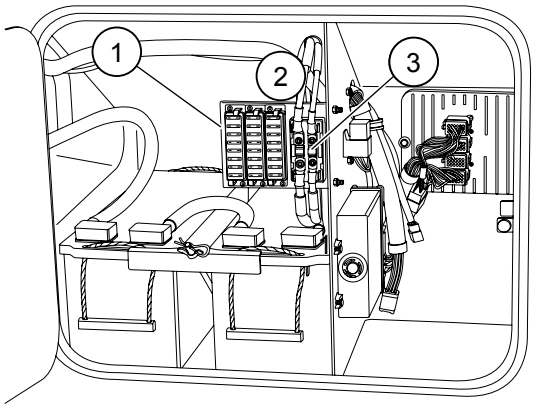

Figure 84. Fuses and relays in the battery compartment

1. Fuses F51–F58, F71-78, F92-F98 (1)
2. Relay K32 (2), behind the three fuse lines
3. Fuses F61-F62, F80

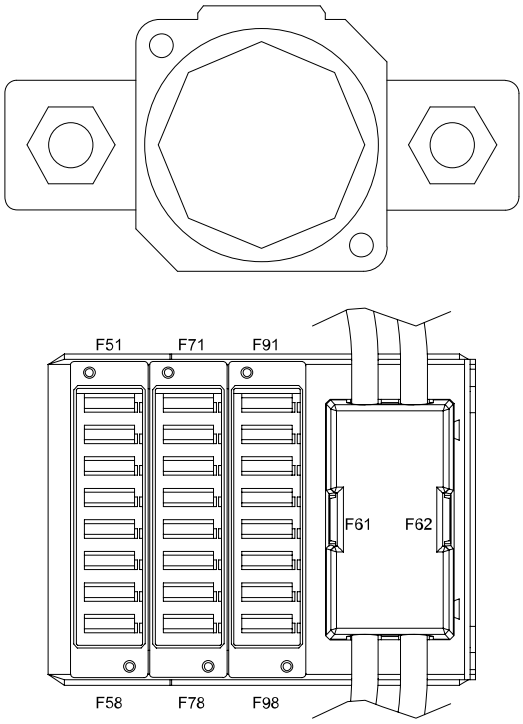

Figure 86. Numbering order of the fuses

Table 16. Fuses and their functions (Functions may vary depending on machine model and chosen options)

Number	Size	Function
F51	10 A	MD4 internal clock (IQAN-MD4 RTC)
F52	20 A	Starter for Scania DC13 EU4/Cummins QSB (15A)
F53	20 A	Scania DC13 EU4 AdBlue control unit/Cummins QSB (15 A)
F54	7.5 A	Cummins QSB (15 A)
F55	7.5 A	Fuel heater (Cummins 20A)
F56	7.5 A	TCU battery power supply (DANA)
F57	20 A	Scania DC13 EU4, VOLVO 660/760 (10A) /Cummins QSB (15A)
F58	20 A	Scania DC13 EU4/Cummins QSB (15A)

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Table 16. Fuses and their functions (Functions may vary depending on machine model and chosen options) (Continued)

Number	Size	Function
F61	100 A	Main fuse 15 ignition
F62	60 A	Main fuse 30 battery
F71	7.5 A	Option
F72	7.5 A	Option (fuel shut-off) (seat suspension air compressor 15 A)
F73	7.5 A	Option
F74	10 A	Engine ignition
F75	7.5 A	DANA/ZF transmission control unit (TCU) ignition power supply
F76	25 A	Hydraulic oil cooler
F77	20 A	Scania DC13 EU4 exhaust gas recirculation valve (EGR)
F78	-	Option
F80	70 A	Cummins engine starter
F81	100 A	Cummins intake air heater
F91	10 A	Attachment lights
F92	10 A	Chassis 48-pin STD F
F93	10 A	Chassis 48-pin STD F
F94	10 A	Chassis 48-pin STD F
F95	10 A	Chassis 48-pin STD F
F96	10A	Chassis 48-pin STD F
F97	10A	Chassis 48-pin STD F
F98	10 A	Power supply, attachment

Relays

Relays K32, K35, and K36 are mounted next to the main fuses in the battery compartment. K101-K135 are mounted behind the operator seat in the cabin.

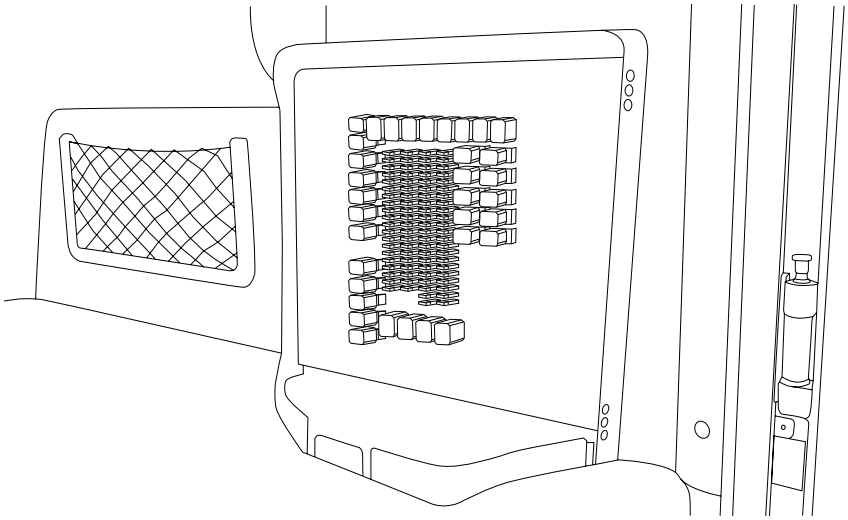

Figure 87. Relay location K101-K135

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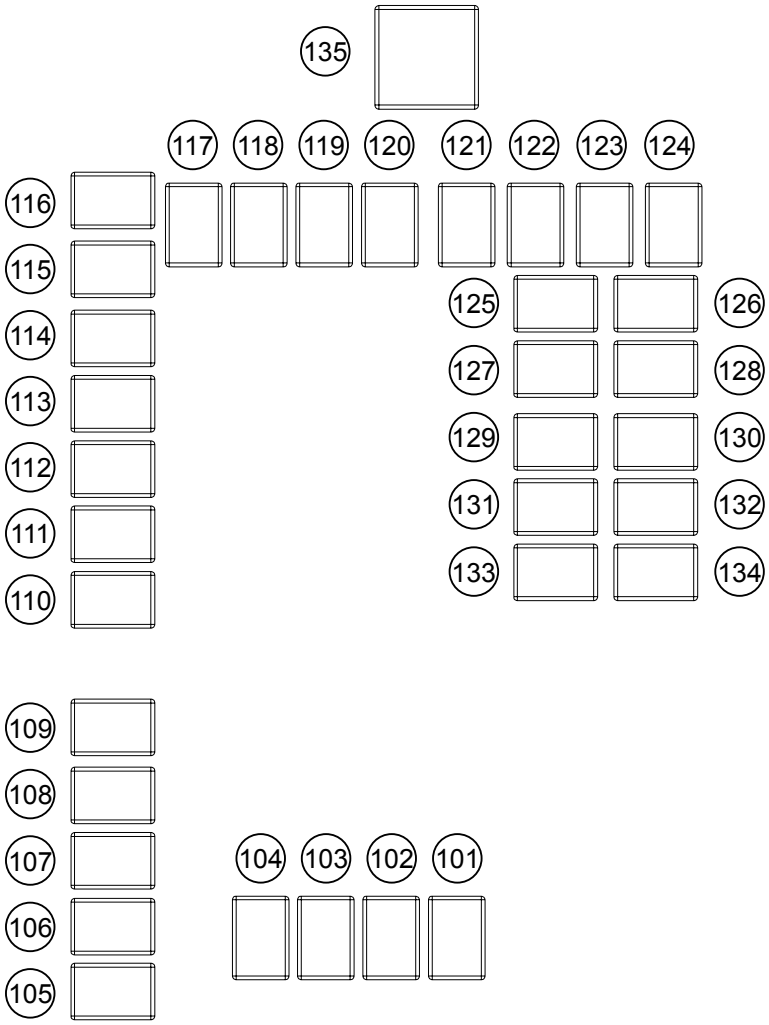

Figure 88. Relays K101-135

Table 17. Relay functions (Functions may vary depending on machine model and chosen options)

Number	Function
K31	Volvo 620, 722, Engine starter
K32	Q1 ignition
K33	Ground support for K31
K35	Engine shut-off for Volvo engines (Engine starter Cummins QSB and QSM)
K36	Fuel heater
K63	Starter lockout Cummins
K64	Intake air heater Cummins
K65	DEF hose heating 1 Cummins
K66	DEF hose heating 2 Cummins
K67	DEF hose heating 3 Cummins
K68	DEF heater relay
K101	Pre-heating power supply for HVAC (heating, ventilation, air-conditioning)
K102	Signal for HVAC (heating, ventilation, air-conditioning), engine running with cabin doors closed
K103	Brake lights
K104	Inverted road light (turnable seat)
K105	ACR RFID keyless ignition

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Table 17. Relay functions (Functions may vary depending on machine model and chosen options) (Continued)

Number	Function
K106	Working light mast F121 and F122
K107	Working light extra 1
K108	Front alarm
K109	Door switch
K110	Low beam
K111	High beam
K112	Clutch for HVAC compressor
K113	Blinker right
K114	Blinker left
K115	Working light extra 2
K116	Backup Light/Right
K117	Central lubrication pump chassis
K118	Option
K119	Option
K120	RCU 3
K121	Working light roof F161, F162
K122	Windshield wiper motor roof
K123	Windshield wiper motor rear
K124	Rear/front window washer motor
K125	Rear window heating
K126	Windshield wiper motor front, 1st speed
K127	Rear/front window washer motor
K128	Windshield wiper motor front, 2nd speed
K129	Horn
K130	Fuel heater
K131	RCU 1
K132	RCU 2
K133	Option
K134	Communication radio
K135	Hazard
K201	Attachment lights (opt)

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